AGRICULTURAL *Chemicals*

IN THIS ISSUE:

Synthetic Vs Phosphoric Acid

'58 Cotton Pest Control

Pesticides in Fertilizers

'57 Fertilizer Consumption

Alabama Pestorama

Spraying Jack Pine Pulp Logs

Aerial Spraying

Superphosphoric Acid

Emulsifiable Concentrates

'58 Insecticide Dusterhouse

Pesticide Handling

JANUARY, 1958

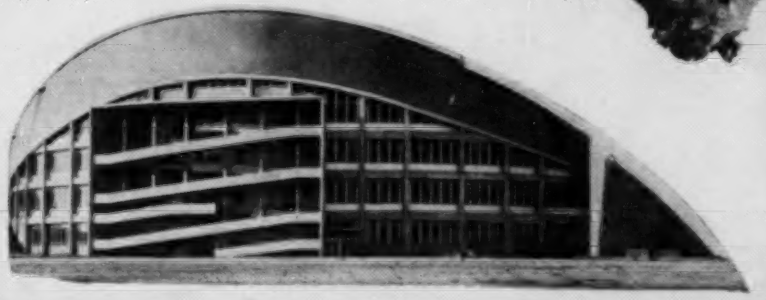
root knot nematode

boll weevil on cottonbud

red banded leaf roller

Pestorama

rodent pest



SENSATION of the
KANSAS CITY FEED PRODUCTION SCHOOL

*"THE BAGPAKER"**

IP's Improved, New "Model AF"

- **Fills Faster – up to 25 bags per minute**
- **Saves Labor – 1 man operation**
- **Saves Paper – uses bags 3' to 5' shorter**
- **Handles Pellets, Crumbles, or Mash**
- **Adaptable to Feeds, Fertilizers or similar products**

Maintains same filling rate whether you use 50 or 80 lb. bags

Savings in Filling Operation with The Bagpaker new "Model AF" can pay for the machine in even a fair season.*

*TRADEMARK

For detailed information, call or write AC-1 no obligation

International Paper COMPANY

BAGPAK DIVISION

220 EAST 42ND STREET, NEW YORK 17, N. Y.

BRANCH OFFICES: Atlanta · Baltimore · Boston · Chicago · Cincinnati · Cleveland · Dallas · Denver · Kansas City, Kansas · Los Angeles · Minneapolis · New Orleans · Philadelphia · St. Louis · San Francisco · IN CANADA: The Continental Paper Products, Ltd., Montreal, Ottawa, Toronto

Sign up now for the 1958

HEPTACHLOR

INSECTICIDE PROGRAM

SALES SUPPORT IN DEPTH!

THE 1958 HEPTACHLOR DEALER "SALES-BUILDER" PROGRAM—For many years, Heptachlor promotional campaigns have helped formulators increase demand at the dealer level.

In 1958, we would like to increase this support of your own sales program. For this reason, we have taken the best features of previous programs, and added new features, based on information obtained in discussions with farm supply dealers everywhere. The result is a more comprehensive and penetrating program: sales support in depth.

INSECT CONTROL REFRESHER COURSE—We have found that most dealers would appreciate more basic information about the use of insecticides. On the other hand, any dealers who are experts themselves must work with inexperienced sales people. Also, your own salesmen cannot afford to spend the time necessary to explain all aspects of insecticide use to all dealer personnel. Thus, the 1958 Heptachlor program will include an informative "salesman's insect control refresher course." Your dealers will be provided with information that will enable them to discuss insecticides more freely with their customers. It will enable them to sell insecticides with authority and intelligence. Included in the program will be "down to earth" sales techniques that every dealer can use, regardless of size.

MONTHLY INSECT CONTROL GUIDE SHEET—Each month, your dealers will receive an insect control guide sheet, containing information about crop pests common to their part of the country. These sheets will include insect appearance, life habits, damage, control. They will serve as a continuing textbook.

MONTHLY INSECT CONTROL INFORMATION SERVICE—NEW PROMOTIONAL AIDS—Current insect control information will be provided on a continuing basis through a monthly newsletter. There will also be many profit-making promotional aids. Participating dealers will receive advance copies to stay ahead of competition.

OTHER IMPORTANT FEATURES—Those of your dealers who participate in the Heptachlor program will receive a free listing in any Velsicol advertising run in their local areas. A reference list of these dealers will be prepared, and sent to farmers who request the name of a source for Heptachlor formulations.

FIND OUT NOW HOW THE 1958 HEPTACHLOR PROGRAM CAN HELP YOU INCREASE DISTRIBUTION AND SALES! MAIL THIS COUPON TODAY!

VELSICOL

VELSICOL CHEMICAL CORPORATION
330 East Grand Ave., Chicago 11, Ill.

International Representative: Velsicol International Corporation, C. A. P.O. Box 1687 • Nassau, Bahamas, B.W.I.

HEPTACHLOR	CHLORDANE	ENDRIN
PARATHION	METHYL PARATHION	GIBBERELLINS

VELSICOL CHEMICAL CORPORATION AC-18
330 East Grand Avenue, Chicago 11, Illinois

Please send me complete details of the 1958 Heptachlor Insecticide Dealer Sales-Builder Program.

Name_____

Company_____

Address_____

City_____ Zone____ State_____

This Month's Cover

A gigantic presentation of all phases of pest control is scheduled for exhibit at the Alabama State Coliseum in Montgomery, Ala., January 20-21, in Alabama's first Pestorama, sponsored by the Alabama Association for the Control of Economic Pests. See story on Page 37, this issue.

Vol. 13, No. 1 January, 1958

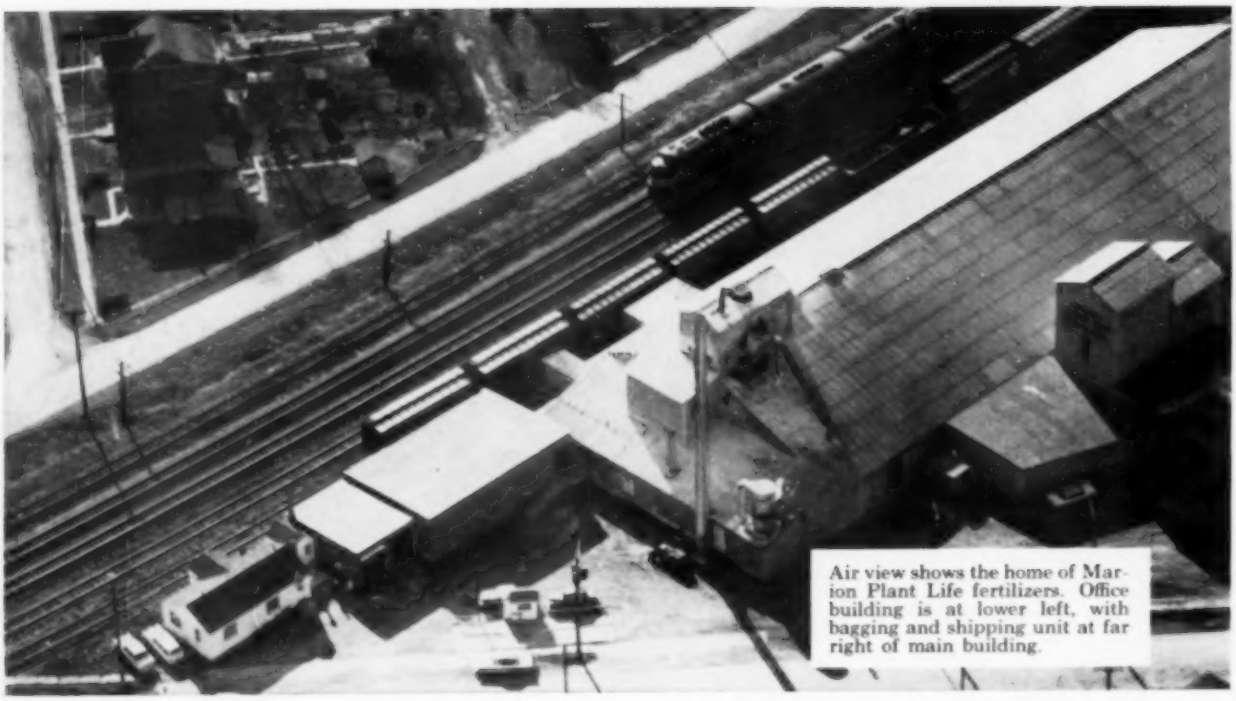
AGRICULTURAL Chemicals

ARTICLES

FEATURES

MEMBER AUDIT BUREAU OF CIRCULATIONS

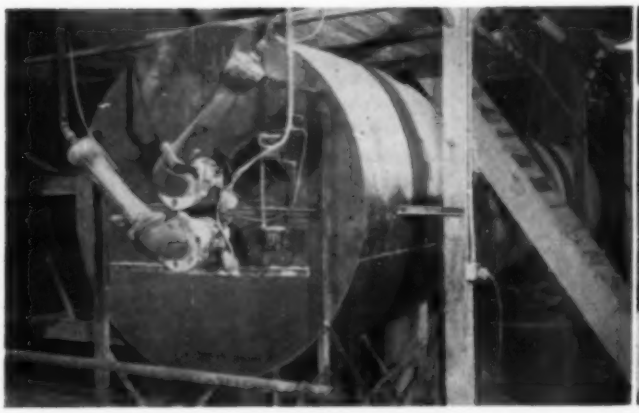
PUBLISHED monthly on the 1st, by Industry Publications, Inc.
ADVERTISING and Editorial Office, P. O. Box 31, Caldwell, New Jersey.
PUBLICATION Office: 123 Market Pl., Baltimore, Md.
CHICAGO ADDRESS: P. O. Box 126, Park Forest, Ill. SKyline 6-4499.
ENTERED as second-class matter November 4, 1949 at the Post Office at Baltimore, Md., under the Act of March 3, 1879.
SUBSCRIPTION RATES: United States, 1 year, $3.00; 2 years, $5.00. Canada and Pan American countries, 1 year, $4.00; 2 years, $7.00. All other foreign countries, 1 year, $9.00; 2 years, $15.
SINGLE COPIES: current issue: $0.50; all back numbers $1.00. Postage and handling charges for foreign countries on single copies: $1.00. Claims for missing numbers will not be allowed if received more than 60 days from date of mailing. No claims allowed from subscribers arising from failure to notify the Circulation department of a change of address, or because a copy is "missing from files."
ADVERTISING RATES known on request. Closing date for copy—5th of month preceding month of issue.



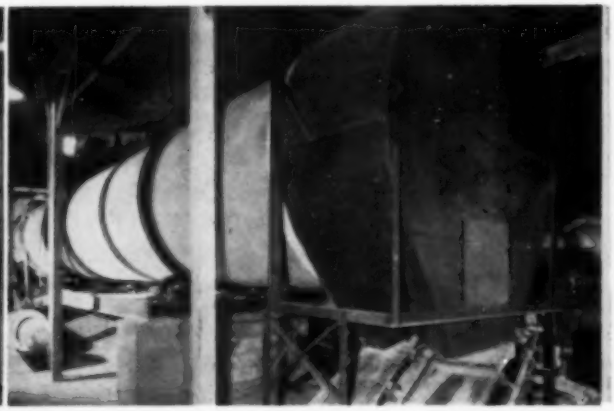
Air view shows the home of Marion Plant Life fertilizers. Office building is at lower left, with bagging and shipping unit at far right of main building.

"We've found 4 big reasons for choosing International's Triple"

- ✓ **ammoniates well**
- ✓ **high analysis triple—costs less per unit P_2O_5**
- ✓ **makes a very satisfactory granular product**
- ✓ **dependable service**



Compact arrangement of plant features combustion unit in foreground with continuous-type ammoniator-granulator located above.

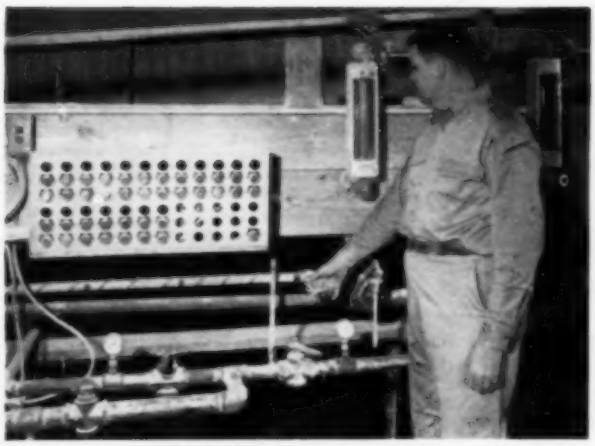


Drying and cooling units are located at ground level. Dryer extending from left is paralleled by a cooler located at the rear.

President George H. Alber supervises activities from this attractive office.

"That's why we schedule
International's Triple Super"

says George H. Alber, President, Marion Plant Life Fertilizer Co., Marion, Ohio



Control panel operated by Plant Superintendent Fred Ioerger is located near ammoniator-granulator. Three men, including one man at controls, and foreman keep plant operating when "on stream."

People around Marion, Ohio, regard George H. Alber as an "unofficial pace-setter" for the fertilizer trade in that area. He organized the Marion Plant Life Fertilizer Co. in 1937 and serves as president of the company. In 1955 he switched all plant operations to granular fertilizers.

"We know what we're looking for in basic goods," says Alber. "Every ingredient must measure up to top quality standards. That's why we schedule International's Triple."

There's no secret about the choice. "We like the way it ammoniates . . . and the granular product we get. It's a high-grade phosphate that costs less per unit. And we can count on dependable service and delivery, any time."

These same benefits can be yours when you use International's superior quality Triple Super. Write or wire for full information.

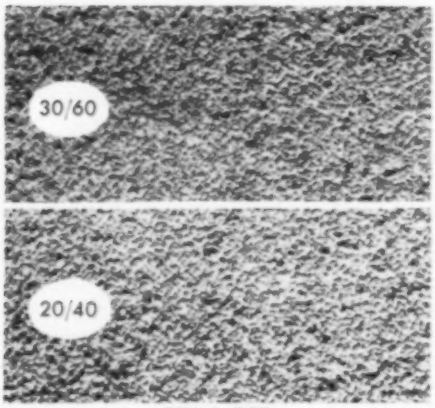
INTERNATIONAL MINERALS *International* **& CHEMICAL CORPORATION**

PHOSPHATE CHEMICALS DIVISION .... 20 N. WACKER DRIVE, CHICAGO 6, ILL.

Florex and Floridin

granular carriers serve formulators and agriculture best.

Granular pesticide formulations deposit the chemical where it's most effective . . .



ACTUAL SIZE

Have you received the new Floridin bulletin on agricultural chemical processing? It's free; write today.

Although we've been making granular carriers for a half century, recent new techniques in agricultural pest control have proven granular formulations to be efficient, economical and easily applied, with pesticide residues on foliage at harvest time greatly reduced. The method is already established for combating European corn borer, Japanese beetle larvae, white fringed beetle grub, corn root worm, wireworm, mosquito larvae, and other turf and soil pests.

Because of the amphibole-like structure of Floridin adsorptive granular fuller's earth products, uniformity and speed in formulation are at their best. Produced in a variety of mesh sizes, including the popular 20/40 and 30/60 ranges, regular Florex and Floridin granulars are available for rapid disintegration in water, or in calcined grades for resistance to disintegration in water.

Build your granular pesticide formulations and your fertilizer-pesticide mixtures on Florex or Floridin granules. Use the type carrier which has actually given superior performance in field tests.

FLORIDIN COMPANY

Adsorbents
Desiccants
Diluents

DEPT. M P. O. BOX 989 TALLAHASSEE, FLORIDA

Industry Meeting Calendar

Jan. 4-5—Texas Fertilizer Conference. Texas A&M. College Station. Texas.

Jan. 8-10—Northeastern Weed Control Conference. Hotel New Yorker. N.Y.C.

Jan. 13-15—1958 Weed Society of America and Southern Weed Conference. Peabody Hotel. Memphis. Tenn.

Jan. 14-15—Georgia Plant Food Educational Society. Univ. of Georgia. Athens. Ga.

Jan. 21-22—North Carolina Pesticide School. N. C. State College. Raleigh.

Jan. 20-21—Alabama Association for Control of Economic Pests. State Coliseum. Montgomery. Ala.

Jan. 21-23—California Weed Conference. San Jose. Calif.

Jan. 22-23—Northwest Agricultural Chemicals Industry Conference. Hotel Benson. Portland. Ore.

Jan. 23-24—10th Illinois Spray Operators' School. University of Illinois. Urbana.

Jan. 27-31—Purdue Regional Pest Control Operators Conference. Purdue University. Lafayette. Ind.

Feb. 4-6—North Carolina Pest Control Operators' Short Course. College Union. Raleigh. N. C.

Feb. 10-11—Southwestern Branch. ESA. Annual Meeting. Shamrock Hilton Hotel. Houston. Tex.

Feb. 13-14—Agronomists Industry Joint Meeting. Edgewater Beach Hotel. Chicago.

March 4-5—Western Cotton Production Conference. Hotel Cortez. El Paso. Tex.

March 18-20—Western Weed Conference. Hotel Davenport. Spokane. Wash.

April 11-19—International Horticultural Congress. Nice. France.

April 13-15 — California Fertilizer Conference State Polytechnic College. San Louis Obispo

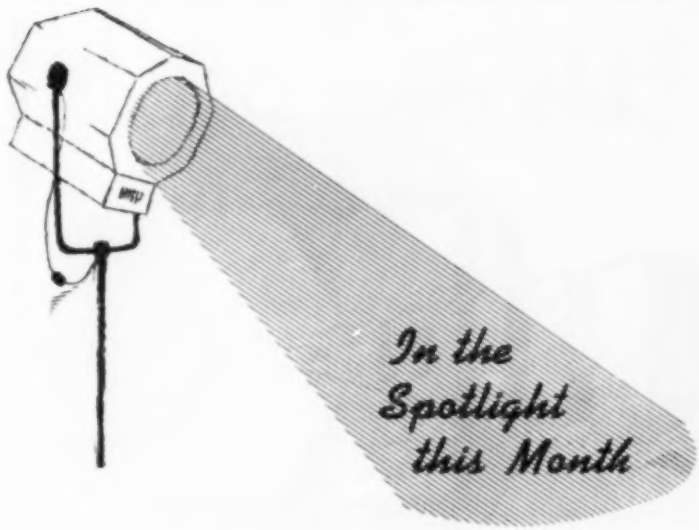
April 22 — Western Agricultural Chemicals Association. Hotel Biltmore. Los Angeles.

June 9-11—Association of Southern Feed and Fertilizer Control Officials. Heart of Atlanta Hotel. Atlanta. Ga.

June 15-18—National Plant Food Institute. Greenbrier Hotel. White Sulphur Springs. W. Va.

June 25-27—Pacific Branch. Entomological Society of America. San Diego. Calif.

July 18-19 — Southwest Fertilizer Conference and Grade Hearing. Buccaneer Hotel. Galveston. Tex.



- **1957 Fertilizer Consumption** . . . The preliminary report for the year ended June 30, 1957, shows a small gain over the previous year (1.3%). Although national consumption is up, there are decreases in 20 of the 51 tabulated areas. Of the liquid fertilizers, the use of nitrogen solutions shows the highest proportional increase, — more than doubling in most regions. Page 35.

- **Spraying Pine Pulp Logs** . . . Control of insects in jack pine pulpwood also retards development of decay for considerable periods. R. D. Shenefelt and associates give results of spraying investigations, and point out that the question of benefits and economics needs to be analyzed for specific localities and conditions. Page 38.

- **Phosphoric vs Sulfuric Acid in Granulation** . . . Both acids are employed successfully in granulation; sulfuric acid on the whole makes agglomeration somewhat easier than does phosphoric acid, since it gives higher reaction temperatures . . . Phosphoric acid enables the production of more concentrated fertilizer grades. Page 28.

- **Making Credit Selling Pay** . . . A participant in discussions at the Agricultural Ammonia Institute outlines a program of selling on credit, mortgaging crops, and discounting the notes. Page 41.

- **Aerial Spraying** . . . United Heckathorn's manager of the aviation division, Gale Hansen, describes operation of an aerial spraying company, endorses more regulation by CAA. Page 42.

- **Handling Pesticides** . . .Precautions to be observed in the manufacture, formulation, packaging of agricultural chemicals. Page 45.

- **Superphosphoric Acid** . . . Review of TVA's process for production of superphosphoric acid. Researchers observe that one important superiority of superphosphoric acid as compared with ordinary phosphoric is that it is substantially less corrosive to metals and alloys. Page 51.

Trade Listing

National Agricultural Chemicals Association, Association Building, 1145 19th St., N.W., Washington, D. C. Lea Hitchner, executive secretary.

National Plant Food Institute, 1700 K St., N. W., Washington, D. C. Paul Truitt and Russell Coleman, executive vice-presidents.

Soil Science Society of America, 2702 Monroe St., Madison, Wisc. L. G. Monthey, executive secretary.

American Phytopathological Society, S. E. A. McCallan, secretary, Boyce Thompson Institute, Yonkers, N. Y.

American Chemical Society, 1155 16th St., N. W., Washington, D. C.

Association of Official Agricultural Chemists, P. O. Box 540, Benjamin Franklin Station, Washington, D. C., William Horwitz, secretary-treasurer.

Agricultural Ammonia Institute, Hotel Claridge, Room 305, Memphis, Tenn., Jack Criswell, executive vice president.

American Society of Agricultural Engineers, F. B. Lanham, secretary, 505 Pleasant St., St. Joseph, Mo.

Carolinas-Virginia Formulators Association, 516 S. Salisbury St., Raleigh, N. C. Hugh Horn, secretary-treasurer.

California Fertilizer Association, Sidney Bierly, executive secretary, Suite 1, Boothe Building, 475 Huntington Drive, San Marino, California.

Chemical Specialty Manufacturers Association, 110 East 42nd St., New York City, Dr. H. W. Hamilton, secretary.

Entomological Society of America, 1530 P. Street N. W., Washington, D. C., R. H. Nelson, secretary.

Mid-West Soil Improvement Committee, 121 West Wacker Drive, Chicago 1, Ill. Z. H. Beers, executive-secretary.

National Nitrogen Solutions Association, 2217 Tribune Tower, Chicago, Ill. M. F. Collie, secretary.

National Cotton Council, PO Box 9905, Memphis, Tenn.

American Society of Agronomy, 2702 Monroe St., Madison Wisc. L. G. Monthey, executive secretary.

Weed Society of America, W. C. Shaw, secretary, Field Crops Research Branch, Beltsville, Md.

Western Agricultural Chemicals Association, Charles Barnard, executive secretary, 2466 Kenwood Ave., San Jose, Calif.

We are 100 years old in 1958

And here is our birthday resolution: To make our second century a still better one for our customers, our friends, our family of employees and our company.

It feels *good* to reach a hundred. To live and grow that long, it must be that we have created products and services that benefited many people.

In creating those products, we have had the help of generations of able, skilled Bemis employees. They have been essential to our progress and we appreciate their fine contribution.

We have tried to develop and make *better* packages and other products for the benefit of our customers, and in turn, *their* customers. To whatever extent we have succeeded, we are gratified.

The years have given us opportunity to make uncounted friends . . . most excellent friends . . . and these we prize beyond expression.

But most of all, these years have permitted us to develop the experience, the facilities, the talented personnel, the leadership to let us do an even better job in the second hundred years.

The Bemis Centennial Emblem represents this aim. It is an open book, symbolizing the story of Bemis . . . the 100-year bookmark placed to indicate that the story will continue into another century of service.

Bemis

Good news travels fast!

More growers than ever before rely on aldrin as a SOIL INSECTICIDE

Each year thousands of growers tell each other of the tremendous success they're having with aldrin as a soil insecticide. Aldrin's effective kill of soil insects helps them get bigger yields of better quality corn.

You can take advantage of this widespread acceptance of aldrin by including it in your recommendations and formulations. The dependability and effectiveness of aldrin insures customer satisfaction and confidence.

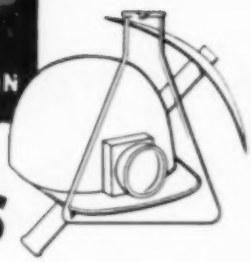
Aldrin is easy to use. It can be applied as a spray, as granules—or included in a fertilizer mix. (Aldrin is compatible with all fertilizers.) Whichever method is used, aldrin gives the best in economical soil insect kill.

To develop the most effective aldrin formulations, Shell Chemical research teams work with growers, county agents and entomologists in the field. For latest technical information, write to:

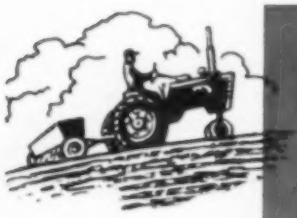
SHELL

SHELL CHEMICAL CORPORATION
Agricultural Chemical Sales Division
460 Park Avenue, New York 22, New York

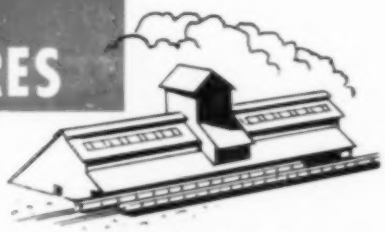
TENNESSEE CORPORATION



PRIMARY PRODUCERS
OF
FERTILIZER CHEMICALS



MANGANESE SULFATE
MANGANOUS OXIDE
COPPER SULFATE
ZINC SULFATE
IRON SULFATE
MINERAL MIXTURES



We have manufactured and maintained a consistant research program in the field of nutritional trace elements and their application to fertilizers for more than thirty years. Our background and basic position in this field is your assurance of a plentiful supply of quality materials.

YOU cut cost with combined carloads from one basic source.

YOU can save money, time, plant space and effort through the use of our custom formulated mineral mixture service.

WE back up our products with service, research and technical assistance.

NUTRITIONAL TRACE ELEMENTS ARE OUR BUSINESS

Foliar Nutritional Products Include

NU-IRON, NU-Z, NU-M, ES-MIN-EL

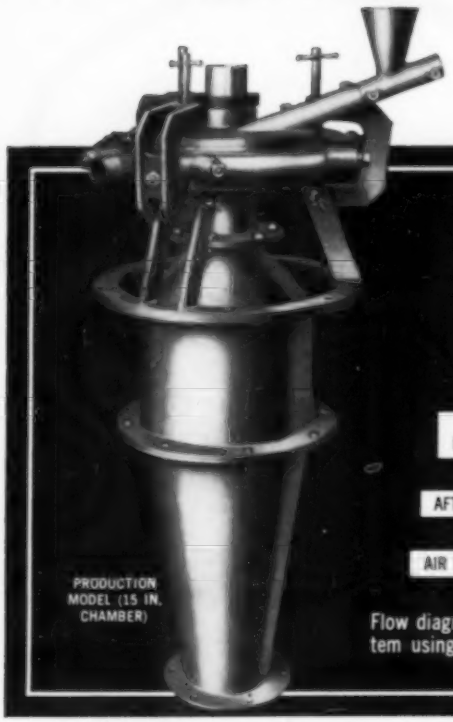
Make request on your Company letterhead for samples or literature.

TENNESSEE CORPORATION

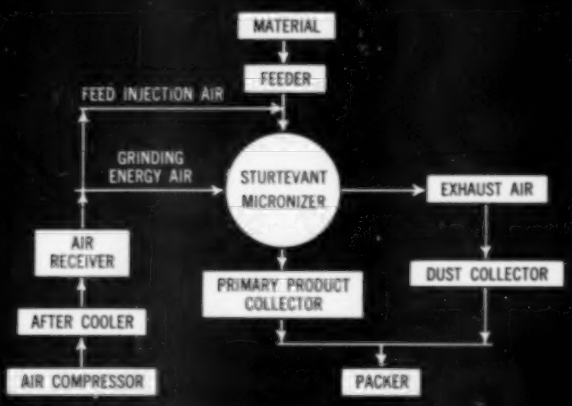
617-629 Grant Building, Atlanta, Ga.

Insecticides to I.C.A.-W.H.O. Specs.

Sturtevant Micronizers* Meet the Problem For Wettable Grades



PRODUCTION MODEL (15 IN. CHAMBER)



Flow diagram of Sturtevant designed micronizing system using compressed air. Steam also may be used.

Particles Grind Each Other, Classifying is Simultaneous; No Attritional Heat

One operation. Sturtevant Micronizers grind and classify in a single fluid-jet chamber — provide fines in range from ½ to 44 microns to meet today's increased product fineness requirements. Because of impact action and cool atmosphere, even heat-sensitive materials can be handled.

No moving parts. Particles in high speed rotation, propelled by compressed air or steam entering shallow grinding chamber at angles to periphery grind each other by violent impact. Design provides for instant accessibility, easy cleaning.

Simultaneous classification. Centrifugal force keeps over-size materials in the grinding zone, cyclone action in central section of chamber classifies and collects fines for bagging. Rate of feed and pressure control particle size of fines.

Can combine other processes. Sturtevant Micronizers can be adapted for coating one material with another and for effecting chemical reactions and changes in physical characteristics, while in process of reducing solids to micron size.

Eight models available. Grinding chambers are in eight sizes, ranging from 2 in. diameter laboratory model (½ to 1 lb. per hr. capacity) to large 36 in. diameter production model (500 to 4000 lbs. per hr. capacity). Send today for fully descriptive literature.

LOWER MICRON MATERIALS SET NEW STANDARDS IN THESE FIELDS:

Pharmaceuticals
Pigments (natural and synthetic)
Copper compounds
Filler materials
Aluminum compounds
Resins
Flour
Sugar
Calcium compounds
Heat sensitive materials
Magnesium compounds
Zinc compounds
Waxes and fatty acids
Fungicides and insecticides

CAN TEST OR CONTRACT MICRONIZING HELP YOU?

Laboratory test-micronizing of your own material, or production micronizing on contract basis, are part of Sturtevant service. See for yourself the improvement ultra-fine grinding can contribute to your product. Or, if you have limited requirements for ultra-fine grinding, Sturtevant's contract micronizing service may be the economical answer. Write for full details.

Fluid-Jet Systems For Special Needs

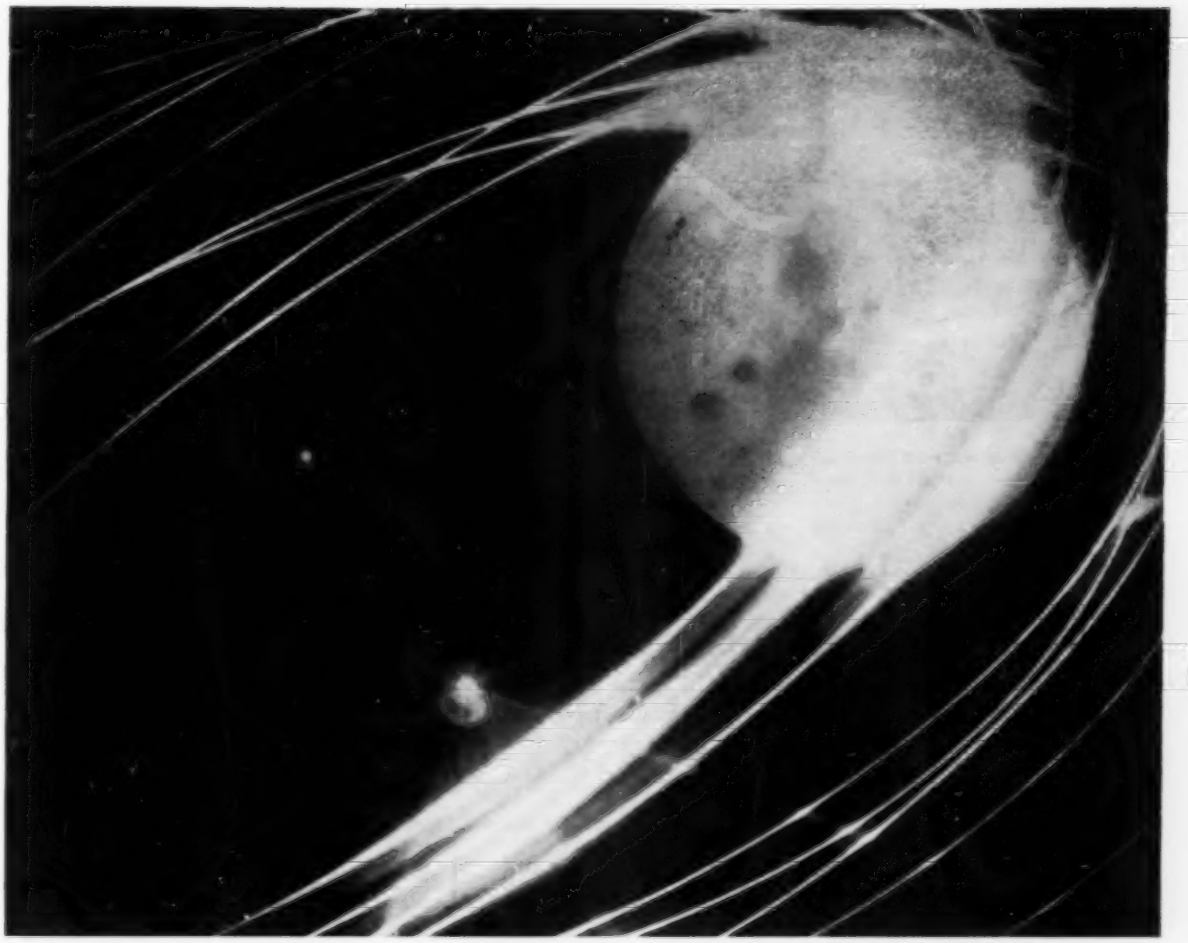
A 30 in. Sturtevant Micronizer is reducing titanium dioxide to particle size under 1 micron at a feed rate of 2250 lbs. per hr. For another firm, a 24 in. model grinds 50% DDT to 3.5 average microns at a solid feed rate of 1200 to 1400 lbs. per hr. A pharmaceutical house is using an 8 in. model to produce procaine-penicillin fines in the 5 to 20 micron range. Iron oxide pigment is being reduced by a 30 in. Micronizer to 2 to 3 average microns at rates of 1000 lbs. per hr. Sturtevant Engineers will help you plan a Fluid-Jet system for your ultra-fine grinding and classifying requirements. *Write today.*

*REGISTERED TRADEMARK OF STURTEVANT MILL CO.

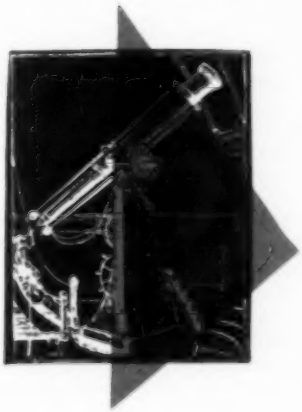
STURTEVANT

MILL COMPANY 123 Clayton St., Boston 22, Mass.

CRUSHERS • GRINDERS • SEPARATORS • BLENDERS • CONVEYORS • ELEVATORS



ARE CROWN MULTIWALLS REALLY SUITABLE FOR SPACE TRAVEL?



The problem of how best to ship mortar-mix to Mars may very well confront packaging experts in the next decade or so. When that time comes, will Crown Multiwalls be the ideal container for the job? Will they be meteor-resistant? Can they withstand blast-off?

We're not trying to answer these questions—yet. Frankly, we're too busy assuring the bright future of Crown Multiwalls in *other* ways.

To guarantee a perpetual source of supply, for instance, Crown Zellerbach maintains its vast forest reserves by planting nearly 15 million seedlings every year.

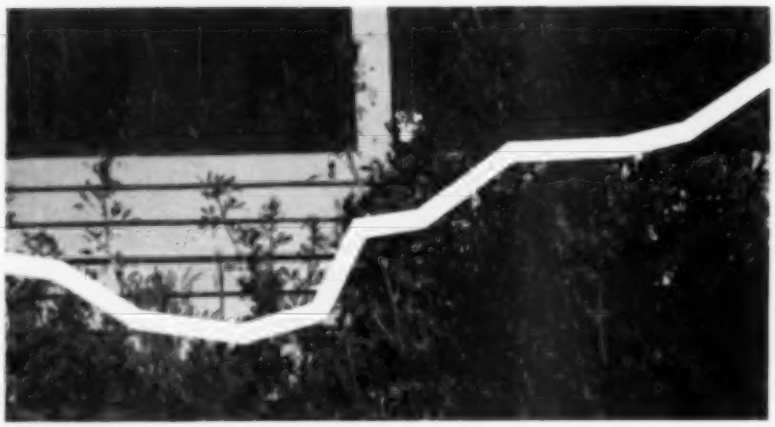
To meet the ever expanding market, new Crown Multiwall Bag Plants have recently been constructed—one in Antioch, California, the other in Bogalusa, Louisiana.

To keep abreast of new manufacturing concepts and new packaging ideas, Crown Zellerbach is constantly modernizing and improving its facilities.

These things all add up to the fact that Crown Multiwalls really *are* shooting for the stars—in quality, in service, in dependability. And when the time comes for space travel in its literal sense—we'll be ready for that too.

CROWN ZELLERBACH CORPORATION

SALES OFFICES: ATLANTA • BIRMINGHAM • CHICAGO • COLUMBUS • DALLAS • DENVER • HOUSTON • KANSAS CITY
LOS ANGELES • MINNEAPOLIS • NEW ORLEANS • NEW YORK • PORTLAND • SALT LAKE CITY • SAN FRANCISCO • SEATTLE • ST. LOUIS



In a Washington State test, sweet clover responds to moly fertilization with yield of 1.5 tons of hay per acre (area at right). Control area (left) yielded only 0.7 ton per acre.

(Photo courtesy State College of Washington).

Average yield or high production? Moly may make the difference

Moly can give striking increases in yields, even on land farmers thought was "good enough"

During the past few years agronomists and many farmers have witnessed the dramatic upturn of crop yields when small additions of molybdenum were made to moly-starved soils. These results have been widely reported, and today the more obvious symptoms of moly-starvation are quickly recognized by most county agents.

But how about the much larger areas where moly-deficient soils might be described as undernourished rather than starved? Here moly can make the difference between average yields, average quality, average profits and high yields of premium quality crops that mean extra income.

At the present time these areas of potential response to moly treatment are known to include large parts of the eastern U.S. and much of the arable land of the Pacific Northwest. They take in many productive farms whose owners, lacking a standard of comparison, are reasonably satisfied with present yields.

In these areas, tests by experimental stations and growers alike have established that moly applications can boost yields by 12 to 93%. Although such improvements are not perhaps as spectacular as in moly-starved soils, they have already added to the profits of individual farmers. Broad-scale treatment of these undernourished soils can contribute substantially to overall farm production.

How Moly Works

A fact that has emerged from many studies of micronutrients is that moly is essential to nitrogen fixation. Legumes require moly for the fixation of atmospheric nitrogen by the bacteria in their root nodules. All crops need it to reduce nitrates to nitrogen—the first step in protein synthesis.

When there isn't enough available moly in the soil to satisfy plant requirements, crops literally starve to death (as in the case of serious, visible deficiencies), or achieve only a fraction of their potential growth (as in the case of many fields with "normal" productivity).

On the other hand, small amounts of moly have given both substantial increases in crop yields and marked improvement in quality to many farmers who were once content with fair to average production. In many cases alfalfa has a higher protein content when "normal" fields are treated with moly. Cauliflower runs to large size, more succulent flavor.

Consider the effect of moly on a typical few of the 30-odd crops for which responses have been reported:

Alfalfa—In field tests in New Jersey, Dr. Harold J. Evans of Rutgers University obtained an average increase in yield of 13%, marked improvement in protein content. In field tests in Spokane County, Washington, Dr. H. M. Reisenauer of the State College of Washington found that treating molybdenum deficient fields with moly increased yields an average of 40%.

Melons—A Virginia grower reports that with moly treatment he gets an average of 7 runners per vine with each runner bearing a large melon. Untreated plants bear fewer runners, much smaller fruit.

Peas—In eastern Washington and northern Idaho, where both dry edible and seed peas are a major crop, commercial use of moly is producing more peas per pod, more pods per vine. And vines are longer, easier to harvest. Yield increases in commercial tests have averaged 63%. Many farmers realize a return of $10 on each dollar invested in moly.

Cauliflower and Lettuce—Growers on Long Island and in upstate New York, in Rhode Island and mid-New Jersey report more vigorous cauliflower plants with heads of better quality. Color and leaf structure of lettuce improved. Yields were consistently higher than for untreated fields.

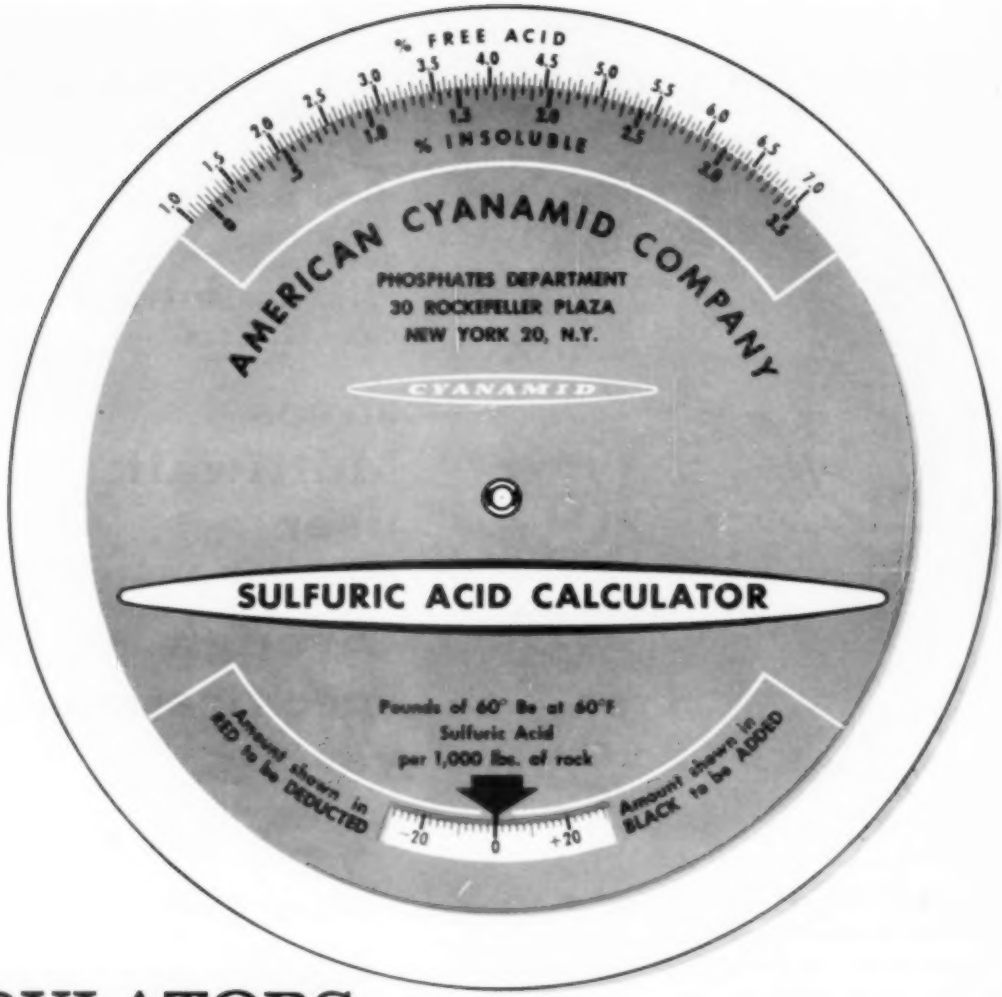
Testing is Easy

Although crops vary in their moly requirements and responses vary with soils, there is one sure way for a grower to find out whether he can increase the yield and quality of a particular crop on a particular soil: run a field test. It's easy to do.

A stock solution for such tests is made by dissolving one ounce of sodium molybdate in one gallon of water. For vegetable crops, select and mark one or more rows through the center of the field. Mix three cups of the stock solution with one gallon of water and apply to the test rows, using about a quart to a 250-foot row. Compare the test rows with untreated rows every other day. Check yields and quality against untreated areas at harvest.

For legumes, lay out a test plot 10 yards square in a location that will make it easy to compare with untreated soil. Follow the usual fertilizer plan, but do not use nitrogen on either the test plot or the control areas. Spray the test plot with three cups of stock moly solution to a gallon of water. This may be done at the time of seeding, or to an established stand. Because increases of 25% or less are difficult to evaluate visually, clipping tests should be made.

For detailed information on the handling of moly test plots write Climax Molybdenum Company, Dep't. 43, 500 Fifth Avenue, New York 36, N. Y.



For ACIDULATORS

This sulfuric acid calculator is another of Cyanamid's working services to the phosphate industry. Whether your requirements are high grade phosphate for acidulation or triple superphosphate for ammoniation, Cyanamid serves you from the mine to your plant:

- direct order service to our Brewster, Florida plant
- traffic specialists to help route your shipment to get it to your plant when needed
- technical service at your plant

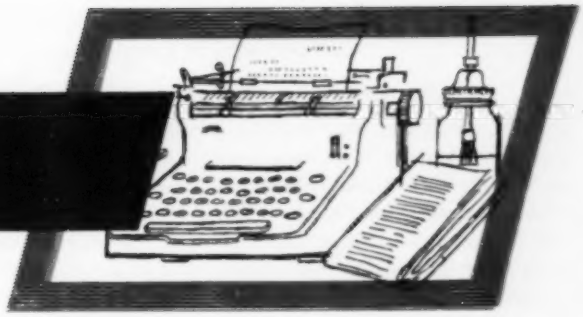
For free calculator, write American Cyanamid Company, Phosphates Department, 30 Rockefeller Plaza, N. Y. 20, N. Y.

CYANAMID

Producers of:
High grade phosphate rock
TREBO-PHOS Triple Superphosphate

Considering the pros and cons of phosphoric acid versus
acid. Working conditions in the area

EDITORIALS



REPRESENTATIVES of the fertilizer industry in a recent appearance before a Congressional Committee considering the new appropriations bill for TVA made a very strong case for this government agency getting out of the fertilizer business, or at least sharply reducing its present cut-price competition with commercial producers. This country has certainly gone a long way in the direction of state socialism in the past twenty years if legislators continue to be deaf to the appeals of an essential taxpaying industry like fertilizer manufacturing for protection against the unfair competition of a nontaxpaying Government agency, which is perfectly free to fix the selling price for its product with little or no relation to actual cost, and which is under no pressure to make a profit.

More recently, a report has been made public following study of TVA's Distributor Demonstration Program by a group of eleven consultants named by TVA to evaluate the program. This report, which is reviewed fully elsewhere in this issue (Pgs. 84, 85) observes that the amount of fertilizer distributed by TVA "has exceeded that which can be justified on the basis of education" and recommends that "the use in mixed fertilizers of TVA materials of types readily available commercially should be discontinued."

Under the guise of "educating the farmer" and conducting a "demonstration program" TVA in the fertilizer year ended July 1, 1956, produced and distributed almost 13% of the entire output of ammonium nitrate, with only an insignificant portion of this total being used in any actually supervised farm-test demonstration program. The balance of the TVA output simply provided cut-price competition for commercial producers who incidentally had capacity to produce substantially more ammonium nitrate than the market would absorb.

The job of getting the farmer to accept ammonium nitrate as a satisfactory fertilizer material has certainly long since been completed. How much longer then, the fertilizer industry asks, can "testing" legitimately be continued? Or as one witness at the recent hearing expressed it, "Why does TVA continue to distribute the principal amount of its ammonium nitrate to the same distributors, and to the same farmers, year after year, under the guise of conducting an educational program? How many times must the same baby be taught how to walk?"

PEST-O-Rama, sponsored by the Alabama Association for Control of Economic Pests, is being held this month in Montgomery to present to the general public for the first time a complete coverage of pest control.

The presentation will be held in the Alabama State Coliseum on January 20 and 21. It will feature exhibits of the latest developments for the control of insects, plant diseases, weeds, nematodes, and rodents. Also included will be information on the newest pesticide chemicals, equipment, and methods of application, and on the pests themselves.

Each of the sixty county agents in Alabama will bring at least twenty people to Pest-O-Rama which insures an attendance of well over 1000 people who are not directly connected with any phase of the pesticide industry. The Alabama Association for the Control of Economic Pests feels that there is no longer any need for the in-

(*Continued on Page* 103)

Fertilizer Granulation

Considering the pros and cons of phosphoric acid versus sulfuric acid in granulation

IT can be said at the outset that both sulfuric and phosphoric acid (furnace and wet process production) can be successfully employed in mixed fertilizer granulation. The use of sulfuric acid in granulation has been much more general than other acids because of general availability. Only recently has very widespread use been made of phosphoric acid.

In choosing between the two acids, perhaps the first consideration is the grades manufactured or contemplated. Phosphoric acid enables the production of more concentrated grades for the simple reason that phosphoric acid accomplishes two purposes, that of phosphorus carrier and an agent for neutralizing ammonia. 100 pounds 65% phosphoric acid provides the same amount of P_2O_5 contained in 100 pounds triple superphosphate plus the neutralizing capacity of 70 pounds 93% sulfuric acid. There is obvious advantage in formulation.

The adaptability of phosphoric acid to various ratios varies with the proportion of nitrogen to phosphorus. The higher the phosphorus in relation to nitrogen, the greater the adaptability of phosphoric acid from the viewpoint of ammoniation capacity. Specifically, the use of phosphoric acid in a 1-1-1 ratio or higher in nitrogen is difficult with the nitrogen solutions normally used. The ammoniation capacity of phosphoric acid is greater than that of superphosphates, but its use reduces the poundage of the superphosphate, the net effect being less ammoniation capacity. With sulfuric acid, the neutralizing capacity is additive to that of the superphosphate.

At this point, it is possible to evaluate cost of ingredients for the grades manufactured or contemplated. As stated earlier, it is my opinion that the principal advantage of phosphoric acid is lower raw material cost. With current prices of the two acids, it is likely that phosphoric has some cost advantage in most locations. Recent new production facilities further improve the cost advantage.

An important difference between the two acids is their heat of dilution, since there is a substantial difference in concentration of the two acids as normally used. The temperature of the fertilizer as discharged from the mixer is somewhat less when phosphoric acid is used. To offset this lower temperature, and resultant lower amount of salt in solution, granulation must be accomplished at slightly higher moisture. These differences are not great, as much as 1% higher moisture being required, but they are a factor. Comparable increased dryer capacity is required to dry to the desired product moisture . . . in this case 1½%.

This discussion assumes the use of ortho-phosphoric acid. If superphosphoric acid, which is a combination of ortho-phosphoric acid and pyrophosphoric acid should become commercially available, then heat-moisture relationships would be considerably different. Those of you attending the T.V.A. demonstration observed the rapid agglomeration and crystallization when using the 76% P_2O_5 superphosphoric acid.

Another practical difference observed in operation of granulation plants is the amount and nature of fumes. The yellowish-brown nitrous oxide fumes which accompany uneven distribution of ammonium nitrate solutions and sulfuric acid in either batch or continuous mixers are noticeably absent when using phosphoric acid. Working conditions in the area of the mixers are substantially improved. No mixer fires have occurred, to my knowledge, when using phosphoric acid only.

In summary, both acids have a place in our granulation work. If there is any appreciable cost advantage with phosphoric acid at your location, its consideration appears to be in order.

—*Rodger C. Smith*
Eastern States Farmers Exchange
West Springfield, Mass.

Further Comments

SULFURIC acid on the whole makes agglomeration somewhat easier than does phosphoric acid, since it gives higher reaction temperatures. The granules are larger but not as hard. In 1-4-4 formulas, water still has to be added, but not to the extent that it does with phosphoric acid. Sulfuric acid furthermore is easier to handle.

Phosphoric acid does not yield the heat of reaction that sulfuric acid does, which makes it harder to agglomerate low nitrogen grades, but is an aid in high nitrogen formulas where the tendency is toward over agglomeration.

In 1-4-4 ratios phosphoric acid forms a smaller granule than does sulfuric acid, but the granule is much harder. There is less tendency for the granules to bind together, therein making an easier flowing material.

Where only small quanities of phosphoric acid are used, it may be-

come necessary to use some sulfuric acid as an aid to granulation. This could become necessary even with larger quanities of phosphoric where you vary from the 7.4# ammoniation rate.

Where it is practical to maintain the 7.4# rate without using additional acid, the phosphoric acid is more economical to use. You get double value, available P_2O_5 and neutralizing value.

Phosphoric acid is much harder to handle than sulfuric. A change in temperature causes such a change in viscosity that it throws instruments off. Victor Chemical Company furnished us with a correction curve for temperature changes that works fairly well with furnace acid, but not with wet process acid. Even then, we measure our storage tank from time to time to check against our instruments.

With wet process acid you have the further complications of solid impurities. Although these solids help in agglomeration, they do not help in instrumentation. We have had times when our lines have choked off completely. Then they had to be torn down, washed out and reassembled.

A better type instrument no doubt would help. It would let us get more accurate data. At the present time we have a Foxboro magnetic type instrument on order. After we have had a chance to use this instrument we may be able to give more reliable data on this subject.

—*T. S. Bosman* Federal Chemical Co.

a discussion of the merits of phosphoric and sulfuric acid

The questions and comments are excerpted from the Fertilizer Industry Round Table Held November 6-8, 1957, Washington, D.C.

What are the economics of using "wet" phosphoric acid in place of furnace acid?

THE primary advantage of wet process phosphoric acid in comparison with furnace grade phosphoric acid is cost. Any other advantages are very much secondary and there are some disadvantages to the wet process acid.

Production of wet process acid involves the reaction of sulfuric acid with rock phosphate, and the filtration or other separation of the insoluble residue. A dilute acid results, of about 30% H_3PO_4 content, containing varying amounts of calcium sulfate residue. The acid is normally concentrated to about 65% acid strength for use in mixed fertilizer manufacture.

The production of furnace acid results from the reduction of rock phosphate in furnaces at high temperatures, the oxidation of volatilized phosphorus to phosphorus pentoxide, and then the reaction with water to form phosphoric acid. With this process, 85% H_3PO_4 can be produced readily, but the 75% grade is normally supplied commercially, because the 80% or 85% grade crystallizes under temperatures which can be experienced in the United States.

The use of phosphoric acid in mixed fertilizer granulation accomplishes two things: (1) reaction with ammonia with its attendant addition of heat to the mixture and (2) provides the nutrient P_2O_5.

Assuming 93% sulfuric acid costs $25 per ton, the neutralizing value of 65% acid is about $17 and that of 75% acid about $20 per ton.

65% phosphoric acid has virtually the same P_2O_5 content as triple superphosphate. Therefore, it can be said that, roughly speaking, 65% phosphoric acid has a value of the cost of triple superphosphate plus $17 per ton. Where 65% grade is available at the price of triple superphosphate plus the cost of equivalent acid, it is good economics to use it.

It appears likely that wet process acid will continue to be lower cost than equivalent furnace grade, considering the two processes of production, the general availability, the amount of electricity required for making elemental phosphorus and the generally lower freight charges applicable to wet process acid delivered to the mixed fertilizer plant.

There have been some reports, both experimental and production, that wet process acid contributes more to granulation than furnace acid. Our experience is that there is very little difference in their effect on granulation. Wet process acid has been used successfully at our Wilmington, Delaware, plant in producing 10-10-10, 8-16-16, 6-18-18, and 6-12-18 as has been furnace acid.

Any significant difference in effect on granulation is related to the concentration. The necessity of using an increased amount of lower concentration acid has the effect of lowering the temperature of the ex-mixer material which necessitates a slightly higher moisture level to accomplish agglomeration. Drying requirements are slightly higher. If the dryer has limited capacity in relation to the rate of production, percentage of acceptable size granules may be reduced slightly and the moisture level of the product endangered.

Perhaps the most important difference between the two grades of phosphoric acid has been in the matter of metering to continuous ammoniators. The viscosity of phosphoric acid

'58 Recommendations at

Cotton

WHERE boll weevil "resistance" has not been a problem there is no change in control recommendations for the 1958 season, stated J. C. Gaines, Texas A & M College, when he addressed members and guests attending the 1957 Beltwide Cotton Production Conference, held December 12-13, at the Peabody Hotel, Memphis, Tenn. On the other hand, he continued, where resistance to the chlorinated hydrocarbons has developed, new recomendations include use of the organic phosphates: malathion, methyl parathion, guthion, and as before, the calcium arsenates. Where varying degrees of resistance in the boll weevil have been reported, Dr. Gaines indicated that mixtures of chlorinated hydrocarbons and the phosphates will be recommended.

DDT will continue to be the leading insecticide recommended for cotton pests not developing resistance, for example the cotton bollworm.

In general, Dr. Gaines observed that the 1958 program of recommendations shows little change from the previous year. The phosphates have been effective in control of such pests as the fleahopper and leafworm, and will continue to be the recommended control materials; phosphates have also been used satisfactorily against the aphid and spotted mite. Interesting and promising results have been reported by investigators working with the new carbamate insecticides and with new phosphorus compounds, but these as yet are not included in the official recommendations.

Dimet and Systox are among the new seed treatment materials in the '58 recommendations.

J. V. Vernon, Niagara Chemical Division, F M C, and president of the National Agricultural Chemicals Association, reviewed some of the problems involved in developing agricultural chemicals, stating that getting scientifically trained personnel in staff research departments is one of the major concerns of the industry. Another hurdle, he said is the risk involved in developing new chemicals. A new pesticide, from inception to readiness for use, costs around a million dollars, and—if the product proves effective, it has a chance to succeed. "But if, for example, resistance builds up quickly by the insect to be destroyed," he said, "you can readily understand how hopeless can become the chances of recovery of risk capital."

Development of toxicity data on which residual tolerances may be established so that safe uses of pesticides may be prescribed and directed was cited as another hurdle. The process is expensive and time-consuming.

In describing problems arising out of federal and state legislation, Mr. Vernon cited the agricultural chemical industry's record of supporting sound legislation such as the Miller Amendment to the Food, Drug, and Cosmetic Act and model state pesticide laws as recommended by the Council of State Governments and the Association of Commissioners, Directors and Secretaries of Agriculture.

H. G. Johnston, National Cotton Council, commenting on technology stated that the boll weevil and certain other insects are benefiting from many of the improved production practices cotton growers are using. Improved technology has been a tremendous factor in more efficient production. Such practices increase yields and hold down the per pound cost of producing cotton.

But the results have not all been on the credit side of the ledger, he pointed out. Practices such as irrigation and increased fertilization stimulate plant growth and rapid fruiting and extend the growing period into late season. "In general, this furnishes an abundant food supply for boll weevils going into hibernation," Dr. Johnston said. "And it means they are well fed, fat, vigorous, and in a better condition to survive the winter. On this basis, we may expect even larger over-wintering populations in the future."

While pointing out that chemicals will continue to be a major factor in cotton insect control, Dr. Johnston said the cotton industry must make a determined effort to develop a boll weevil control program that will not be dependent on chemicals alone. Leading entomologists for many years have urged the use of cultural practices as an essential part of an effective program, he stated. One of these practices is early stalk destruction.

At one time a lack of suitable tools kept early stalk destruction from becoming a general practice. But with the rapid development of mechanization and agricultural chemicals, Dr. Johnston pointed out, adequate tools are now available. These include effective stalk shredders and more efficient defoliants and desiccants. To

Production Conference

show little change

be fully effective, the weevil's food supply should be eliminated not later than October 1-15, he recommended.

The discovery of resistance to insecticides in cotton pests has caused a tremendous change in thinking on insect control programs, remarked C. F. Rainwater, of the U. S. Department of Agriculture. This discovery, he said, has resulted in greater activity in basic boll weevil research.

Scientists recently learned how to rear the boll weevil on a semi-synthetic diet in the laboratory. "This offers tremendous opportunities," he said, "for productive research in developing new insecticides, attractants and repellents; in developing resistant varieties of cotton; in utilizing chemicals that are antagonistic to growth development and fertility of the boll weevil; and in development of new methods and concepts of control."

Mr. Rainwater pointed out that such basic research has opened the door to the discovery and development of a new insecticide, belonging to a class of chemicals different from any in widespread use today. It promises to be effective against many cotton insects. Although the product was not named, the speaker indicated that by next year U.S.D.A. may be able to recommend this new insecticide.

Both the cotton grower and entomologist are turning their attention to new control programs, he said. Early season applications of insecticides to prevent insect buildups are gaining in popularity at the expense of the traditional method of applying chemicals to reduce high insect populations.

"We are very optimistic over the future of cotton insect control," Mr. Rainwater said. "We have the resistance problem with us, and we have no reason to think that additional insect pests won't come into this category sooner or later, but with our research scientists working on these problems, we'll keep ahead."

Weed Control in Cotton

Use of pre-emergence herbicides enabled Louisiana scientists to combat severe weed problems in cotton during the past "wet" year, reported W. K. Porter, Jr. and C. H. Thomas of the Louisiana Experiment Station. Weed control in cotton is, of course, important in any year, they observed, but the need for efficient and economical control methods is especially important in a wet year.

An Arlington Tennessee cotton grower, Robert G. Wilson, endorsed the successful use of chemicals for economical weed control. "Since I began chemical weed control," he said, "my chopping cost has been reduced, and I have not had to transport labor." In 1957, "the wettest crop year I have experienced," he reported a chopping cost of $7.96 per acre, and $2.50 for chemical. In looking ahead, Mr. Wilson said that if wages become prohibitive on the farm, it will become even more important for costs of chemical or flame control methods to be held to a minimum.

The correct time for controlling cotton diseases is before planting, Texas Extension plant pathologist Harlan E. Smith told the Conference. Diseases, he said take an estimated 15 per cent of the early crop. Good cotton disease control programs vary from state to state, county to county, farm to farm, and even field to field in some areas. "Most cotton diseases are controlled by prevention, and prevention requires planning."

Mr. Smith gave a list of suggestions which would simplify the formulation of a disease control program. Suggestions included listing the most serious diseases that have occurred in the community during the past ten years because these are the diseases that are likely to recur.

A team approach to fertilization is helping Georgia cotton farmers become more efficient, advised Dr. Ralph Wehunt of the University of Georgia College of Agriculture, who described an "intensified soil fertility program" now under way in six counties in the south central extension district of Georgia. The project is part of a $200 million soil fertility program, with the following objectives: (1) to acquaint farmers, and business leaders with the major role of fertilizers and lime in making a better Georgia agriculture: (2) to assist farmers in carry-

(*Turn to Page 95*)

Two of the speakers at the annual Belt-wide Cotton Production meeting: (l-r.) Claude Rainwater, USDA, and Jack Vernon, Niagara Chemical Division, FMC

due left on the edible parts of crops

use of this pesticide cause any hazard

Various Pesticides in fertilizer

AT present, combined applications of pesticides with fertilizer solutions are limited to a few uses on a limited number of crops, but the future of combined applications is greater. I plan to present to you some of the problems that will be involved in combined applications of these two types of material and hope that I can give you a picture of the problem as a whole so that you can understand the present limitations and proceed without running into difficulties.

According to Webster, a pesticide is "any substance used to kill rats, insects, bacteria, fungi, protozoans, etc." This is rather a broad classification of materials so I will limit my discussion as far as possible to pesticides in general with insecticides, herbicides and fungicides specifically in mind.

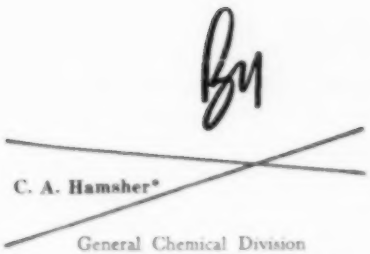
Pesticides are commonly divided into broad groupings such as insecticides, herbicides or fungicides, but these are often again further separated by their mode of action on the pest being controlled. Insecticides are classed as contact poisons when the material must be in direct contact with the insect for it to be effective. This contact may either be by application directly onto the insect or by depositing the material in locations where it will be contacted by the insect. Some contact insecticides work either way while others will work only in one way. Insecticides may be classed as stomach poisons if they must be eaten before they will kill the insect. They must be applied to locations where they can be eaten by the insect that is to be controlled. Insecticides that kill insects by vapor action are classed as fumigants and usually must be applied with special equipment and with special handling. Some insecticides may act in more than one of these ways, but usually they are limited to one mode of action or at least only one mode of action in killing any specific pest. To further confuse the issue, but perhaps to improve your situation, we now have some systemic insecticides which are taken up by the plant either through the roots or through the foliage and then kill the insect feeding upon other parts of the plant.

Fungicides are usually classed as either protectant or eradicant types, although some materials act in both ways. A protectant type of material must be used in preventative treatment, whereas the eradicant type is used as a cure after the disease is present. Experimental work is now in progress on the use of systemic types of fungicides which may change our entire plant disease control situation.

Herbicides are a little more difficult to classify, although often broken down into selective and non-selective or "soil sterilant" types. Selective herbicides are used in crop production and are sometimes further classified as pre-emergent or post-emergent types. These classifications are rather confusing as often one material may be selective at a low dosage but non-selective at higher dosages and may be used either pre- or post-emergence. A different type of classification could be based on mode of action, such as contact for those herbicides that kill weeds on which the material is sprayed; hormone types for those that are taken up by the plant and kill by upsetting the plant's physiology; or as sterilants which when applied to the soil will kill all susceptible plant species for a period of time.

Most pesticides are selective in the pests that they will control, usually controlling only a limited number of closely-related pest species. Insecticides usually have no action as fungicides or herbicides and vice versa. Most important is to use the right material in the right concentration and at the right time for the particular pest problem involved.

Pesticides are marketed in various formulations, often influenced by the physical characteristics of the technical material. Specific formulations may be designed to suit the potential use of the material. Typical pesticide formulations are dusts, granulars, wettable powders, emulsifiable concentrates, oil soluble concentrates and water suspensions. The emulsifiable concentrates are the ones at present that are most suited for application with fertilizer solutions. Emulsifiable concentrates usually contain the technical material dissolved in a highly



C. A. Hamsher*

General Chemical Division
Allied Chemical & Dye Corp.

aromatic solvent, such as xylene, or one of the petroleum solvents. An emulsifying agent is added to this solution to permit it to be emulsified in water to form a stable homogeneous mixture. As most pesticides are applied in application equipment with some means of agitation such as a by-pass pump or paddles, standard pesticide formulations contain only sufficient emulsifying agent to keep them emulsified with such agitation.

The time when a pesticide should be used is dependent on the habits of the specific pest or the time when the pest is present. A protectant fungicide, a stomach poison, or a pre-emergent herbicide all require application before the pest is present for good control. This also must be immediately before the pest is present so that there is no loss in coverage due to plant growth, weathering or washing off of the residue. Most of these materials require a complete protective film for success. If the pesticide kills by contact with the pest at time of application, it can be used successfully only when the pest is present. If the residue kills by contact, fresh residues are most effective and application must be just prior to need. Another important factor in timing pesticide applications is to be sure that the application is made at an early enough date to insure that there is no harmful residue left on the edible parts of crops at harvest time.

The placement of a pesticide is important in our consideration as we are limited to pesticides which can be combined with fertilizer solutions. This limits us to materials that are effective when applied to the soil. Any pesticidal materials which must be applied to the aerial parts of plants, other than to tiny weed seedlings, are thus eliminated from our program. Therefore, the location of the pest must be in or on the soil for such application to be effective. The systemic materials which I mentioned earlier are a bright spot for your future as they can possibly be applied to the soil and then be translocated by the plant to the aerial portions of the plant.

To generalize, we have a wide diversity of materials in a wide diversity of formulations for the control of a wide diversity of pests, but we can usually find the right material in the right formulation for each specific pest. There is not only a right material, but there is a right time for its use and a right place to use it. Quite often we must also include the right piece of equipment to insure successful control. Specifically, these are the things that you must think about when planning to combine pesticides with your fertilizer solutions: What is the pest problem? Can it be controlled by soil treatment with an available pesticide? If this pesticide is applied with a fertilizer solution, will they both be applied at the ideal time for pest control and plant nutrition? Will both materials be effective if applied to the soil surface, or under the soil surface, or in bands, or broadcast as may be the usual practice for application of this fertilizer or for control of this pest? Can the chosen pesticide be mixed and stay well-mixed during the entire period of application or will it separate from the fertilizer solution and give an uneven application and erratic results and possible plant injury? Will the pesticide fertilizer mixture have any effect on the germination of seed or on the flavor of this or next year's crops? Will the use of this pesticide cause any hazard to those consuming this crop? Will the use of the pesticide in your equipment contaminate it so that it may be a hazard to use it on other crops later in the season or the following season? Will the use of this combination cause any trouble in application or with your equipment by reacting with metal or hoses, gaskets, etc.? Would seed treatment or some other method of application of the pesticide be more economical and possibly more effective? Should the pesticide be cultivated into the soil after treatment or should it be left untouched on the surface and how does this go with your fertilizer application method? These are some of the questions that you should be thinking over before you start.

Where do you get the answers to these questions? Your State Experiment Station and Extension Service and the local County Agent can be of more assistance to you. The local salesman for the pesticide should also have some of the answers, specifically at least about the use of his own products with fertilizer solutions. Most important, the labels on the pesticide materials give you approved information on the use of that particular product and that particular formulation of the material. The labels should include a statement of the active ingredients of the material and, with emulsifiables, usually state the number of pounds of actual pesticide per gallon of formulation.

The label will give you a warning as to any precautions that should be taken during and after the application of the material and if it is a poisonous material, antidote information is also shown. Labels always contain directions for use of the material, listing pests that will be controlled, dosages needed to control these pests and preferably methods of application. Directions for use also contain any information on the time before harvest when applications must stop in order to prevent any toxic residue on the harvested crop.

Any pesticide product shipped across a state line must bear a label approved by the USDA in Wash-

*This report was presented as part of a panel discussion at the National Fertilizer Solutions Association meeting, held November 17-19, in Cincinnati, Ohio.

land, Mountain, and Pacific, their ton-

ington and for such approval it must conform with the recommendations and accepted uses of the USDA. Most states now have laws similar to the federal registration laws so that locally-produced pesticidal products usually have labels that meet the federal requirements. By all means, I repeat, read the label and follow its directions in order to stay out of trouble. As most labels are written to cover usage in a large area, local recommendations should be consulted to check local timing and usage.

Now that you have read all the labels of the available products and checked local spray programs and the local extension service, we hope that you have found a pesticide that you think you can use with your fertilizer solution. You have probably chosen an emulsifiable concentrate which says on its label that it is formulated for use with liquid fertilizers or fertilizer solutions. You must now determine whether or not this pesticide formulation will work with your solution. The manufacturer of the pesticide may have checked it with certain fertilizer solutions but I can guarantee that he has not checked it out with all of the available solutions in the country. You must do this for yourself to be sure that you will not damage or clog up equipment; that you will not damage crops; or that you will not fail to obtain pest control and plant nutrition at the same time.

To check compatibilities of these materials with your solutions is not difficult, and is certainly an excellent policy. You should simply mix proportional amounts of the pesticide and fertilizer solution in small quantities and observe the results. The components to be checked should be mixed well, with the pesticide being added to an equal amount of water and thoroughly mixed and then this added to the fertilizer solution and again mixed. Mixing is preferably done by shaking in a container such as a one pint mason jar and observing the results. Do not use a tight closure on the jar while mixing or afterwards as it is conceivable that certain materials may react and cause a pressure buildup. This mixing can best be accomplished by using a flat mason lid held in place with the hand. If the material is compatible you will observe the pesticide staying in dispersion well. Be careful of any occurrences that indicate a reaction such as the evolving of gases or the formation of insoluble or gelatinous precipitates. One specification for a pesticide to be satisfactory for use with fertilizer solutions includes, "Materials which give perfect homogeneous mixtures on agitation and which separate after agitation is stopped in not less than ½ hour and in addition after standing overnight will again form a homogeneous mixture on agitation will be considered satisfactory." Best results have been received when the pesticide is added to the water and mixed before adding to the fertilizer solution; however, the best mixing procedure for the product which you are using should be stated on the product label.

I will not discuss the plant mixing of pesticides with fertilizer solutions as I do not believe that it is practical with the presently available materials and their formulations. It is not only difficult to produce such a material with a long shelf life, but the inventory problem will certainly be a headache. Most satisfactory will be mixing the pesticide with the fertilizer solution just prior to application.

I believe that I have reached the point where I can't put off any longer the various pesticides which can be used in fertilizer solutions. The material which has found the most use to date is Aldrin, with some commercial use of Heptachlor. There has also been very limited use of BHC, Lindane, Chlordane, DDT, Dieldrin, etc. A limitation to the use of some of these materials as well as other materials experimentally has been the incompatibility of formulations, the contamination of soil with materials which could give off-flavor to future crops, etc. 2,4-D has been used to a very limited extent, chiefly for the control of weeds in corn. We understand that certain ester formulations of 2,4-D are the only ones that have worked well with nitrogen fertilizer solutions and not all 2,4-D esters are compatible with these solutions. The 2,4-D is used for control of broadleafed weeds infesting corn and is usually applied during the 2nd and 3rd cultivation. Application with nitrogen solutions at this time may be risky. Nitrogen lying on top of the ground with the possibility of a small amount of rainfall from the side dressing time until corn harvest may be a waste of nitrogen. Nitrogen on top of the ground does not produce a corn crop. 2,4-D applied below the soil surface will not kill the broadleafed weeds. Rainfall is the determining factor of how effective the weed control and the nitrogen application will be—and you can't control the rain. Most important is the fact that when 2,4-D is used, you have contaminated your equipment and it may be risky to use this equipment in sensitive crops.

Probably the major present fertilizer solution-pesticide combination is Aldrin and fertilizer solutions on corn for the control of corn root worm as well as corn nutrition. Potential uses of pesticides such as clover root borer, wireworms, strawberry root borer, seed corn maggot, sugar beet root maggot, cabbage maggot, southern corn root worm, seed corn beetles, grubs, etc.

There has been limited experimental use of fungicides with fertilizer solutions in some states, but I know of no use recommended at present.

We are now only at the very beginning of the use of pesticides with fertilizer solutions. When we have the newer systemic materials available for such combination uses, we will really get rolling. The last bit of advice that I can give you is to expect no more from the combined application of a pesticide and fertilizer solution than you would get from separate applications of the materials. You may even have to give up something in control or nutrition with this combined treatment, but any loss should be compensated for by a reduction in number of applications and saving in time.★★

Commercial Fertilizers and Primary Plant Nutrients

1957 Consumption in the United States

by Walter Scholl, F. B. Crammatte, M. M. Davis

Fertilizer Investigations Research Branch
USDA, ARS, Soil and Water Conservation Research

THE tonnage of commercial fertilizers consumed in the United States and territories (Hawaii and Puerto Rico) during the year ended June 30, 1957, showed a small gain over that used in the preceding year. The total consumption amounted to 22,485,000 tons, an increase of 292,000 tons or 1.3 per cent (Table 1). Consumption of mixed fertilizers amounted to 14,575,000 tons—a decrease of 201,000 tons (1.4%)—and of materials for direct application 7,910,000 tons—an increase of 493,000 tons (6.6%). Included in the materials are 6,956,000 tons of products containing one or more of the primary plant nutrients (N, P_2O_5, K_2O), 929,000 tons of secondary and trace nutrient materials, and 25,000 tons not classified. The use of materials containing primary nutrients increased in the amount of 328,000 tons (4.9%) and secondary and trace nutrient materials by 139,000 tons (17.6%) over their respective use in 1955-56.

Although the national consumption of fertilizers showed an increase in 1956-57, compared with 1955-56, there were decreases in 19 of the 51 tabulated areas. Most of the decrease in total fertilizer consumption was accounted for by 9 of the 13 states comprising the South Atlantic, East South Central, and West South Central regions—while the Pacific and West North Central regions accounted for most of the increase. There was little change in the total tonnage of fertilizer consumed in the East North Central and Middle Atlantic regions—in these—more fertilizer was used in all but 5 of the 12 areas. Most of the states in the New England and Mountain regions, and the territories, showed relatively large proportional increases in total fertilizer consumption.

Mixtures

THE consumption of mixed fertilizers was found to have increased in all but 23 of the tabulated areas. Most of the decrease occurred in states of the South Atlantic, East South Central, East North Central, and West South Central regions—areas in which the principal increases occurred were the territories, and the Pacific and West North Central regions, in this order.

The ten grades consumed in largest tonnage in the Continental United States in 1955-56 were also found to be consumed in largest tonnage in 1956-57. These ten represent 50 per cent of the tonnage of all mixtures consumed in both years. In all regions except the New England, Mountain, and Pacific, their tonnage represents 40 per cent or better of the total tonnage of mixtures consumed in the respective regions. The trend in New England is to use grades having a higher proportion of nitrogen while those in the Mountain and Pacific regions generally contain less potash than shown by the average of these ten grades.

Materials

IN all but 15 of the tabulated areas the consumption of materials[4] for direct application was higher than in 1955-56. Areas showing decreases were not necessarily the same as those in which mixtures were also found to have decreased. In 9 states, however, there were decreases in both mixtures and materials—five were in the South Atlantic and West South Central regions.

The use of chemical nitrogen materials compared with 1955-56 increased 392,000 tons (12%) and potash materials 52,000 tons (13%), while the use of phosphate materials and the natural organic materials decreased 108,000 tons (4%), and 8,000 tons (2%), respectively.

Of the liquid types of chemical nitrogen materials, the use of nitrogen solutions showed the highest proportional increase (87%) from 109,000 tons in 1954-55 and 1955-56 to 204,000 tons in 1956-57. Their use more than doubled in most regions except the Middle Atlantic and Pacific

Table 1—Consumption of primary plant nutrients, year ended June 30, 1957, in 1,000 tons. (Preliminary)

Region[1]	Content of mixtures				Content of all fertilizers[2]				Percent change in all nutrients from 1955-56
	Nitrogen	Available P_2O_5	K_2O	Total	Nitrogen	Available P_2O_5 [3]	K_2O	Total	
New England	25	42	43	110	30	49	45	124	5
Middle Atlantic	99	207	197	503	118	225	200	543	4
South Atlantic	308	425	452	1,085	382	442	481	1,305	- 3
East North Central	203	504	504	1,211	316	576	613	1,505	6
West North Central	91	201	170	462	282	368	196	826	11
East South Central	99	214	186	499	300	258	232	790	3
West South Central	49	90	66	205	234	156	87	477	2
Mountain	7	10	2	19	87	60	4	151	11
Pacific	35	59	20	95	307	105	34	446	7
Continental U. S.	806	1,751	1,650	4,209	2,056	2,219	1,692	6,167	4
Territories	35	19	13	67	69	24	43	136	18
Total: 1956-57	841	1,772	1,663	4,296	2,125	2,243	1,735	6,303	4
1955-56	797	1,785	1,655	4,237	1,933	2,247	1,875	6,055	0
1954-55	804	1,821	1,658	4,283	1,960	2,284	1,875	6,119	1

[1] The States comprising the regions are listed in Table 1.
[2] Content of mixtures and direct application materials.
[3] Includes, as available P_2O_5, 2 percent of the colloidal phosphate and 3 percent of the phosphate rock marketed for direct application.

regions—in these their use decreased. Aqua ammonia and anhydrous ammonia use increased 21 and 12 per cent, respectively. While the use of aqua ammonia is principally in the Pacific region and the Territories, that of anhydrous is in all regions. Consumption was generally 7 to 30 per cent higher in all regions except the East North Central and Territories where decreases were noted.

Solid chemical nitrogen products showed greatest consumption changes in ammonium sulfate, urea, and ammonium nitrate—these were increases of 25, 16, and 15 per cent, respectively—while sodium nitrate use decreased 11 per cent.

The principal change in the use of natural organic materials was a decrease of 22,000 tons (16%) in the total consumption of sewage sludges.

The use of the principal kinds of phosphate materials, in general, showed decreases, except for the ammonium phosphates (11-48, 11-50, 13-39, 16-20, 20-52, 21-53, 27-14) which increased from 362, 153 tons in 1955-56 to 387,000 tons in 1956-57 (7%). The largest decrease was in the total of phosphate rock and colloidal phosphate—from 930,914 tons to 829,000 tons (11%)—while superphosphates, 22% and under, and superphosphates, over 22%, decreased 7 and 14 per cent, respectively.

The change in consumption of the potash materials was principally the result of a greater use of potassium chloride which increased from 322,411 tons to 373,000 tons (16%).

Table 2—Consumption of fertilizers, by States and Territories. Year ended June 30, 1957. (Preliminary)[1]

State & Region	Mixtures	Materials[2]	Total	Change from 1955-56[3]
	1,000 tons	1,000 tons	1,000 tons	Percent
Maine	160	8	168	- 8
New Hampshire	16	4	20	21
Vermont	38	17	55	10
Massachusetts	69	18	87	17
Rhode Island	15	2	17	13
Connecticut	63	21	84	10
New England	361	70	431	4
New York	503	82	585	2
New Jersey	253	24	277	6
Pennsylvania	565	61	626	- 4
Delaware	83	5	88	2
District of Columbia	2	1	3	- 1
Maryland	269	18	287	2
West Virginia	72	10	82	- 1
Middle Atlantic	1,747	201	1,948	[4]
Virginia	668	102	770	- 1
North Carolina	1,141	316	1,457	-14
South Carolina	566	252	818	- 5
Georgia	1,051	222	1,273	- 1
Florida	1,315	161	1,476	10
South Atlantic	4,741	1,053	5,794	- 1
Ohio	950	82	1,032	- 2
Indiana	877	210	1,087	2
Illinois	505	850	1,355	- 4
Michigan	576	58	634	1
Wisconsin	389	37	426	1
East North Central	3,297	1,237	4,534	[4]
Minnesota	325	91	416	13
Iowa	304	156	460	3
Missouri	442	360	802	- 1
North Dakota	27	66	93	34
South Dakota	9	13	22	-18
Nebraska	23	145	168	26
Kansas	76	127	203	- 2
West North Central	1,206	960	2,166	5
Kentucky	442	100	542	1
Tennessee	400	136	536	4
Alabama	750	283	1,033	- 6
Mississippi	201	441	744	- 1
East South Central	1,993	960	2,855	- 2
Arkansas	140	186	326	-10
Louisiana	137	158	295	- 3
Oklahoma	61	46	107	-21
Texas	274	321	595	5
West South Central	612	691	1,303	- 3
Montana	4	26	30	- 8
Idaho	7	77	84	29
Wyoming	1	10	11	1
Colorado	13	47	60	8
New Mexico	1	36	37	28
Arizona	26	146	172	13
Utah	3	23	26	-15
Nevada	1	6	7	30
Mountain	56	371	427	12
Washington	37	147	184	7
Oregon	29	189	218	31
California	282	[5] 1,846	2,128	6
Pacific	348	2,182	2,530	9
Continental U. S.	14,281	7,727	22,008	[6]
Hawaii	66	123	189	14
Puerto Rico	228	60	288	24
Territories	294	183	477	20
Total: 1956-57	14,575	[7] 7,910	22,485	1
1955-56	14,776	[7] 7,417	22,193	0
1954-55	15,348	[8] 7,378	22,726	2

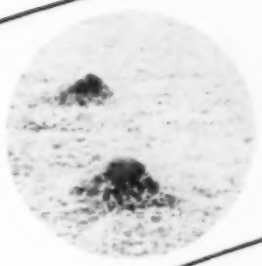
1/ Includes fertilizers distributed by Government agencies.
2/ Includes: ground phosphate rock and colloidal phosphate, basic slag, secondary and trace nutrient materials, as borax, metallic salts, sulfur, gypsum, etc. used as separate materials. Does not include liming materials or the quantity of materials used for manufacture of commercial mixtures.
3/ Based on fertilizers which are guaranteed to contain one or more of the primary plant nutrients (N, P_2O_5, K_2O) for direct comparison with percent change in nutrient consumption (Table 4).
4/ Less than 0.5 percent.
5/ Includes an estimated 250,000 tons of dried manures.
6/ Materials included not guaranteed to contain N, P_2O_5, or K_2O totaled 989,000 tons in 1956-57, 789,605 tons in 1955-56, and 791,606 tons in 1954-55.

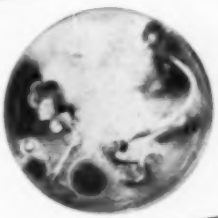
Primary Plant Nutrients

THE total quantity of primary plant nutrients (N, available P_2O_5, K_2O) estimated in all fertilizers consumed in the United States and territories was 6,303,000 tons. This was 248,000 tons (4.1%) more than in 1955-56. The total for 1956-57 comprised 2,125,000 tons of nitrogen, 2,243,000 tons of available P_2O_5, and 1,935,000 tons of K_2O. These quantities represent increases of 192,000 tons (9.9%) for nitrogen and 60,000 tons (3.2%) for K_2O and a decrease of 4,000 tons (0.2%) for available P_2O_5 from the respective consumption in 1955-56. Although the total of fertilizers bearing primary plant nutrients in 1956-57 was but 21,531,000 tons—1,004,000 tons below the peak year of record (1952-53)—the total nutrient content of this lower tonnage of fertilizers contained 675,000 tons more plant nutrients than the larger tonnage in 1952-53.

In contrast to the change in consumption of fertilizers bearing plant nutrients in 1956-57 compared with 1955-56 (Table 2), the total consumption of nutrients increased 2 to 18 per cent in all regions and the territories, except the South Atlantic.

(Continued on Page 93)





ALABAMA PESTORAMA

Photos Above
Weed Control on Peanuts
Dusting Tomatoes
Fire Ant Mounds in Pasture
Soil borne disease

MR. G. R. Williamson, president of the Alabama Association for the Control of Economic Pests, announces that plans for the unique presentation, PEST-O-RAMA, have been well received by members of the agricultural chemical industry, professional agricultural workers, garden club groups, and others interested in the general field of pest control. The idea of presenting all of the phases of pest control—from technical information to actual application of chemicals—has been so well received that attendance at PEST-O-RAMA will be in the thousands. PEST-O-RAMA will be held January 19-21 at the Alabama State Coliseum in Montgomery, Ala.

Mr. W. A. Ruffin, chairman of the attendance committee, recently held eleven dinner meetings for county agents in Alabama. At these meetings chairman Ruffin was assured of the complete cooperation of the county agents in encouraging agricultural chemical dealers, farmers and others to attend PEST-O-RAMA. Vocational agricultural teachers and county agents will bring large groups of 4-H and FFA boys and girls. Two thousand posters have been distributed for use on local levels to promote attendance.

Wonderful cooperation has been received from the local news agencies in giving advance publicity to PEST-O-RAMA, according to R. J. Smith, chairman of the publicity committee. Commercial television stations over the state have offered their complete cooperation. Radio and television farm programs will feature outstanding speakers who will present PEST-O-RAMA to the people. Complete advance radio publicity will be obtained through established Extension Service channels.

Twenty eight commercial firms, covering the entire field of pest control, have completed their plans for displays at PEST-O-RAMA. (See attached list.) President Williamson states that due to the facilities available at the Alabama Coliseum there is still room for more firms to participate. In addition to commercial and educational displays, a complete movie schedule, and demonstrations of application methods and equipment, PEST-O-RAMA will have a program of talks and lectures designed to appeal to all groups of people—regardless of their interest in pest control. Highlights of the program are as follows:

"Perplexing Hurdles in Developing Agricultural Chemicals" by Mr. Jack V. Vernon, president of the National Agricultural Chemicals Association, and also President of Niagara Chemical Division of the Food Machinery and Chemicals Corporation.

"1958 Agricultural Program of the U. S. Government" by U. S. Congressman George Grant, member of the Agriculture Committee of the House of Representatives.

"How to Get Better"—New ideas on sales presentations by Mr. Joseph E. Burger, St. Louis, Mo. In addition to the above, talks on specific pest problems will include:

"Fire Ants and Their Control"—Dr. K. L. Hays, Agricultural Experiment Station, A.P.I., Auburn.

"Control of Insects in Stored Grain and Peanuts"—Dr. W. G. Eden, Agricultural Experiment Station, A.P.I., Auburn.

"Cotton Insect Control"—Dr. F. S. Arant, Head, Department of Zoology-Entomology, A.P.I., Auburn.

A special program has been planned for ladies in attendance at PEST-O-RAMA. Program sections of particular interest to ladies have been planned for both afternoons. In these sections recognized specialists will give authortative talks on such items as household insect control, insect and disease problems on ornamental plants, pest control in lawns, and latest developments in garden pest control.

(*Turn to Page 94*)

Spraying* Jack Pine Pulp Logs

R. D. Shenefelt, M. J. Stelzer, T. A. Pascoe and F. G. Kilp**

SEVERAL workers have demonstrated that control of insects attacking logs can be readily obtained by means of sprays applied just after cutting (see references). McNeel *et al.* (1952) found that control of insects in jack pine pulpwood also retarded the development of decay for a considerable period of time. However, the question of the benefits to be derived from such spraying has remained unanswered. The importance of the financial aspect is self-evident. When the millions of cords of pulpwood cut each year are considered, a penny gained or lost per cord involves a large sum of money and it is as important to know when not to spray as to know when to treat. Insect damage in pulpwood varies with the season of cutting, the method of handling the cut logs, the place of storage, the locality, the weather conditions, the species of tree being cut and the size of the sticks. For these reasons the results given here are to be regarded as indicative only, and comparable tests must be made in different localities and on the different tree types in order to obtain accurate costs and benefits.

To determine the economic feasibility of spraying for control of insects on jack pine pulpwood, a commercial test was started in 1955. An area of land near Ely, Minnesota with a stand of jack pine trees of approximately the same age class, stocking and size was chosen. The jack pine cut for experimental purposes was divided into three lots: 1) peeled, 2) rough-untreated (control), and 3) rough-treated. The cutting for each category was along separate "roads" in the area. Peeled wood was cut from April to July before peeling became impractical. Rough wood used was cut from July 11 to August 18, at which time infestation by wood borers and bark beetles had ceased in the area. In cutting the rough wood, one crew operated in the usual manner and a second crew followed the same procedure, except that they sprayed the logs the day they were cut. A 12% gamma BHC wettable powder was applied by an Indian Fire Pump with an adjustable (Mohawk) nozzle. Approximately one ounce of gamma isomer in one gallon of water was to be applied per cord. Throughout the entire operation scaling was done as closely as possible.

Time studies showed that the most efficient method was to spray each layer of logs as they were piled in the deck and then treat the ends at quitting time. This method required about five minutes per cord for the actual spraying. Water supply was difficult to obtain, and it was often necessary for the cutters to transport the water with them from camp in the morning. At times, swamp water was used. The cutters were paid 15 cents per cord for making the application, the insecticide and equipment being furnished.

Tests made on infested wood which had been cut during March and April again demonstrated the necessity for protective treatment and failure to obtain any significant reduction in insect numbers by spraying after infestation.

Examinations of sprayed and unsprayed wood were made at weekly intervals during the experimental period and the numbers and types of attacks recorded on a square foot basis. By August 1, rough-untreated wood cut July 11 to 15 had 17.57 insect attacks per square foot, while sprayed wood cut at the same time had 0.28 attacks—a reduction of 98.4 per cent.

Adult insects were collected weekly, on a time basis, in order to obtain correlations between emergence periods and periods of greatest attack.

The wood remained at the cutting area until it was shipped to Nekoosa-Edwards' Nekoosa mill in Wisconsin in January and February of 1956. Each type of wood was stored separately in the mill yard by the usual four-tier arrangement, each tier being about 100 yards long and 30 feet high with tiers lying closely alongside each other. The cordage for each type was: peeled —325; rough-untreated —504; and rough-treated —738.

Examinations made in August, 1956, of 200 logs each of rough-treated and rough-untreated wood showed the following percentage reductions in the treated as compared to the untreated: bark beetles 71.4%; Buprestids 4.2%; Cerambycids 97.2%; total insect attacks 81.5%; blue stain 41.4%; surface decay 38.9%. Studies

*Results of a cooperative project between the Department of Entomology, College of Agriculture, University of Wisconsin, The Nekoosa-Edwards Paper Company, The Tomahawk Timber Company and the Wisconsin Conservation Department. Supported in part by the Nepco Foundation. Approved for publication by the Director of the Wisconsin Agricultural Experiment Station.

**Respectively: Professor and Research Assistant, Department of Entomology, University of Wisconsin; Manager, Research Department and Manager of Woodlands Operations, Nekoosa-Edwards Paper Company.

of tree ages and wood density were also made in the yard.

In September, 1956, the experimental wood was processed, each of the three lots being handled individually during the mill run. The logs were taken into the mill, cut to half-length, run through a debarking drum and washed. From the debarking drum they were conveyed to the chipper. Bolts were picked at random from the conveyor and the total numbers of still-visible insect galleries and entrances were recorded. These were correlated in turn with volumes and square feet of surface. By this method a 74.3 per cent reduction of Cerambycid attacks was found in the treated wood. (Four of 416 bolts of treated wood examined had a total of 695 attacks and are believed to have come from trees cut after they were dead (but perhaps before the needles changed color). This would explain the differences in reduction found in the cutting area and yard as compared to the mill.)

After shipping, the chips were screened and stored in bins for mill use. They were then conveyed over a weightometer on a belt conveyor and into the digesters for cooking. Chip samples were taken for moisture determination as the wood passed the weightometer so that the total recorded weight for each lot could be converted to an oven-dry wood weight basis. Samples were also removed for experimental pulp cooks, yield tests and for analyses of chip characteristics. $KMnO_4$ numbers were determined on every blow from the digesters.

Pulp was taken periodically from the valveless decker and a composite of the pulp from each lot sent to the U. S. Forest Products Laboratory for evaluation on their experimental paper machine. Beater tests were also made of these composites. Fifty pound unbleached Kraft papers were made. The pulps were beaten in a 50 pound beater to a Canadian Standard Freeness of about 450 ml. No size was added nor any calendering done on any of the runs. Paper machine conditions were held as constant as possible.

Two 3000-gram laboratory sulfate cooks were made from composite chip samples from each lot of wood. The digester was charged with 3000 grams O.D. wood and liquor of 25% sulfidity applied at 20% active alkali based on the O.D. wood. Dilution ratio was held constant at 3.8 liters of cooking liquor per 1.0 kilogram of O.D. wood. The time-temperature schedule was also held constant. After digester blow-down, the pulps were washed and screened on a 20-cut laboratory vibratory flat screen. The screened pulp was sampled for a $KMnO_4$ number and the yield determined. $KMnO_4$ numbers, beater tests, and physical strength tests were all carried out under TAPPI standard conditions.

Physical tests were made at the Nekoosa-Edwards Experimental Laboratory as well as at the U. S. Forest Products Laboratory.

Results

PEELED wood showed an average moisture content of 19.5% which represents a quite stable condition since the level is below that necessary for most decay organisms. The appearance of the wood indicated that no distinguishable decay had occurred. In rough wood the moisture content, just before mill run, was approximately 30% and stained wood indicated the development of decay organisms.

Insect damage and possible accompanying fungus damage are reflected by the wood density data. If the peeled wood is used as a standard, the loss in density may be used to indicate clearly the wood lost through insects and fungi. Peeled wood had a density of 25.7 pounds per cubic foot, rough-treated wood 25.3 pounds, which was only slightly below that for the peeled. The density of rough-untreated wood was significantly lower, being 24.6 pounds. Assuming the peeled wood to have the maximum or ideal density, the loss was 1.6% in the rough-treated and 4.3% in the rough-untreated.

(Previous studies in Wisconsin had shown losses from a minimum of 0.75% to a maximum of 14.6%, depending on the time of year when cut. Over very short periods of time insect and fungal infestation and infection were very severe in some lots.)

No significant differences in per cent mullen, per cent tear or other physical tests occurred between the pulps made from the three lots.

Yields were the same, 42.7 per cent for rough-treated and rough-untreated wood, but peeled wood gave a yield of 44.1 per cent. Since wood lost by the action of insects and fungi is reflected in a volume measurement such as density, but is not included in calculating yield where the measurements are entirely on a weight basis, the insect damage is not immediately obvious.

The increased yield from peeled wood is perhaps a result of several factors which can only be postulated as occurring. Probably less bark and cambium (low yield materials) are present and thus not charged against yield. Age may also be a factor since peeled logs averaged 12 years older than the rough-treated or rough-untreated (which had exactly the same average age). Storage of rough wood may permit leaching of some water soluble constituents before the wood is utilized.

12% gamma BHC controls insects in jack pine pulp wood—yield of peeled wood shows increase—economics show 95 per cent saving in treated woods

A clearer picture and more exact information may be obtained by using a value or measurement which reffects both changes in yield and density*.

*(lbs. O.D. wood/cu. ft. lot A—lbs. O.D. wood/cu. ft. lot B) X (yield lot A)
(lbs. O.D. wood/cu. ft. lot B) X (yield lot B)
X 100 = % loss or gain

Such a formula is necessary because most pulp wood is purchased on a volume basis while pulp or paper is valued on a weight basis. Volume must also be contended with since the capacity of digesters is fixed.

Taking a cord of rough-untreated wood as the basis for calculation, the following increases in pulp production, holding the amount of wood on a cord basis and the digester volume capacity constant, resulted. Treated wood showed a 2.8% gain in pulp production on a weight basis while peeled wood showed a 4.6% gain.

Justification for wood treatment must be made upon the basis of density-yield variations. These variations in pulp production then can be converted to monetary figures to be used for comparison with spraying or other wood preparation costs.

The number of bark beetles in the rough-untreated wood was only 0.92 per square foot and Buprestid attack was not recorded in the field. For this reason (and since in Wisconsin losses were previously shown to be as follows: 91.3% due to Cerambycids, 7.3% to bark beetles, 1.0% to Buprestids and 0.4% due to miscellaneous insects. The 7.3% of the total caused by bark beetles resulted from an average of 10.5 attacks per square foot.) it was evident that the Cerambycids were responsible, directly or indirectly, for practically all of the loss occurring in the wood cut at Ely in 1955. Hence it is possible to use the Cerambycids in this case as an indicator for expressing potential losses in pulpwood due to these insects.

Log examinations of the wood after debarking in the mill showed 634 Cerambycid attacks per cord in the untreated wood and 163 attacks per cord in the treated, a difference of 471. Assuming the 2.8 per cent yield gained by treating to be equivalent to a 2.8 per cent loss by not treating, and this loss to be the result of the 471 additional attacks present in the untreated wood, the loss per Cerambycid attack is 0.0059 per cent.

Taking the price of a cord of rough Minnesota jack pine delivered to the mill as $26.94, which appears to be a reasonable figure for the Wisconsin mills, the monetary loss for Cerambycid attack, based on the 0.0059 per cent loss per attack is $0.0016. By multiplying the number of attacks per cord by the loss per attack it is possible to calculate the loss per cord. On the basis of the cost per cord used, these are $0.26 and $1.01 per cord for the rough-treated and rough-untreated woods, respectively, or a saving of $0.75 per cord by treatment.

Actually, during treatment (largely as a result of improvement of method of application), 0.71 ounces of gamma isomer were applied per cord instead of the one ounce planned for originally. The total cost of material used (excepting spraying equipment and cost of water procurement) and wages paid to the cutters for spraying (15¢ per cord) came to $0.24 per cord. This left a net gain from treating of $0.51 per cord.

Comparable methods can be used to calculate the relative costs of wood produced by peeling or by different methods of handling.

Attention should be called to the fact that the insect population in the untreated wood used in this study was less than occurs in normal years according to people familiar with the situation at Ely, and it was much less than infestations previously encountered in Wisconsin. For this reason, the $0.51 net gain per cord from treating should probably be regarded as a minimum figure.

Using the solid wood content per cord, the wood volume and lateral area per stick, number of sticks per cord and total lateral area per cord, the loss figure obtained for one Cerambycid attack per square foot can be used to form graphs which can be utilized in determining approximate losses in rough pulpwood stored for one year in the Lake States. By making composite graphs showing the additional losses resulting from bark-beetles and Buprestids it should be possible to arrive at a way of evaluating pulp wood losses due to insects, or directly associated with them, quite accurately.

As a direct result of the demonstration of the practicality of spraying pulp logs for insect control and the benefits derived therefrom, two large users of jack pine in the Lake States have started spraying all wood which is cut during the season of insect activity or stored in the woods during that period. Decks established before insect activity begins are sprayed before the insects become active. Here the spray is applied to the outside and tops of the piles, with care being taken to get the spray as far as feasible on the logs from the end openings. Wood cut during the season of insect activity is sprayed as it is decked the day of cutting.★★

References

Barrett, W. W. 1949. Control of insects in or emerging from pulp wood stored in yards. M. S. Thesis, University of Wisconsin (unpublished).

Becker, W. G. 1955. Tests with BHC emulsion sprays to keep boring insects out of pine logs in Massachusetts. *J. Econ. Ent.* 48(2): 163-167.

Bess, H. A. 1944. Insect attack and damage to white pine timber after the 1938 hurricane in New England. *J. For.* 42(1): 14-16.

Blais, J. R. 1952. Borer control in jack pine and spruce logs. Bi-mon. Prog. Rep. Div. For. Biol., Dept. Agr. Can. 8(1).

Connola, O. P. *et al.* 1953. Survey and control studies of beetles attacking wind thrown trees in the Adirondacks. *J. Econ. Ent.* 46(2): 249-254.

Hetrick, L. A. and P. J. Moses. 1953. Value of insecticides for protection of pine pulp wood. *J. Econ. Ent.* 46(1): 160-161.

McNeel, W., Jr., R. D. Shenefelt and T. A. Pascoe. 1952. Insects in jack pine pulp wood. *Pulp and Paper.* 26(9): 86, 88, 90.

McNeel, W. J. 1955. Insects in jack pine pulp wood and their relationship with fungi. Ph.D. Thesis, Univ. of Wis. (unpublished). (Extensive bibliography).

Stelzer, M. J. 1957. Commercial spraying of jack pine pulp wood for insect control. M. S. Thesis, Univ. of Wis. (unpublished).

Little Rock Welcomes AAI--

TALKS on agronomy, safety, ammonia handling practices, insurance and accounting . . . . highlighted discussions among agricultural ammonia dealers, suppliers, and users attending the seventh annual convention of the Agricultural Ammonia Institute held December 11-13th, at the Marion Hotel, Little Rock, Ark. Registration exceeded 400 members and guests at the three day meeting which was opened with a welcoming address by Governor Orval E. Faubus. AAI president, Fred Stewart, Agricultural Ammonia Service, presided at the opening session.

Concurrent with a trade exhibit, round table discussions on agronomy, safety and handling, ammonia and irrigation, insurance and accounting, were held, with industry experts offering comments and suggestions.

On the basis of discussion at the "safety and handling" round table, it is clear that hose failure appears to be one of the most serious problems in the industry. The rupture seems to take place most frequently at the coupling nipple. No satisfactory means of solving this problem was suggested, since it seems that experience has not yet dictated the best "test pressure" for hose. It was pointed out that hoses which met test pressures as high as 500 pounds were more susceptible to failure than hose which had not been subjected to the overload test. The question then seems to be that if 500 pounds is too high a test pressure . . . what should the load be. . . .?

Other questions considered by the safety panel included: valve, line and hose installation and handling; safety equipment needed for bulk plants . . . water, quick release showers, first aid kits, masks, goggles, gloves, etc; field transfer and application safety considerations; etc.

Agronomy Roundtable

AMONG the topics reviewed by participants in the agronomy discussions were: the agronomic advantages of ammonia that make it a better nitrogen fertilizer regardless of cost? . . . desirable soil moisture and tilth condition for best application; . . . effect of rates of nitrogen on plant uptake, fruit set, protein, feed value and quality of product . . . do plants utilize ammonia directly? etc.

Considerable interest was expressed in the coincidental application of phosphoric acid and ammonia, and

(*Turn to Page 94*)

Seated, left to right, S. C. Smith, The Smith Co., Uvalde, Texas, first vice president; Paul J. Duesterhaus, Duesterhaus Farm Supply, Quincy, Ill., president; Robert E. Poethig, Bastian Blessing Co., Chicago, second vice president.
Standing, left to right, Raymond C. Singletary Jr., Blakely Peanut Co., Blakely, Ga., secretary; C. J. Struble, Standard Oil of Indiana, Chicago, member of executive committee; Fred W. Stewart, Agricultural Chemical Service, Inc., Santa Paula, Calif., retiring president and member of the executive committee; and David H. Bradford Jr., Mid-South Chemical Corporation, Memphis, Tenn., treasurer.

Aerial Spraying . . . .

Loading C82 to spray Glacier Park, 1957

FLYING a big aerial spray project is about the nearest thing one finds in civilian life to the operation of an aerial combat team in wartime. There are the same problems of logistics, the advance planning and strategy, briefing, reconnaissance and many of the same elements of hazard. To get an idea of just how the big commercial custom spray operator solves the problems involved in a tremendous operation AGRICULTURAL CHEMICALS interviewed Gale Hanson, manager of the aviation division for the United-Heckathorn.

Mr. Hanson is a veteran flyer with 11,000 hours in the air, is vice president of the National Aviation Trades Association and was with the Civilian Aeronautics Administration for 15 years, winding up as agricultural aviation specialist with the General Safety Division of CAA. United-Heckathorn, incidentally, are the biggest operators in the field of aerial custom spraying. They own and operate more planes than any other firm in this essential though somewhat hazardous field, they fly more miles, spray and dust more pounds and gallons of insecticides, and have probably made a greater financial success of their operations than has any competitor.

Mr. Hanson was quick to point out that while aerial spraying obviously involves a substantial element of hazard (as could be said of any field where as few as eight to ten thousand operators suffer as many as 100 serious or fatal casualties a year) insurance rates are no higher than for the construction field. Nor does Mr. Hanson feel that aerial custom spraying need necessarily be an excessively dangerous business.

The prime need to help make the aerial spraying business safer is adequate training of personnel before they are put on their own and required to exercise their own judgment and make decisions that could cost them their lives and at the same time pile up a million dollars worth of equipment.

More basic regulation is needed by CAA, Mr. Hanson believes, which is an attitude which might not be shared, of course, by some of United-Heckathorns less favorably situated competitors. In addition, Mr. Hanson calls for uniformity in rules governing aerial spraying throughout the country (there are 34 different types of state regulations), maximum employment of safety equipment and availability of standard types of dispensing equipment. But more of this later.

Mr. Hanson estimates that there are approximately 1,500 aerial applicators in the country, operating 5,000 planes, which are flown at different times by as many as ten thousand pilots. They apply a billion pounds of dry type chemicals and a hundred million gallons of liquids. Basic earning capacity of this equipment is a hundred thousand dollars a year.

Planes for aerial spraying are divided into two types:—large and small—over and under the break-point of 12,500 pounds gross weight. In recent years there has been a great increase in interest in large aircraft for spray operations, because of the economy which they offer and the speed with which they can be counted on to complete the big spraying jobs. There are now some 75 large aircraft in operation, of which United-Heckathorn own or lease 12, in addition to

eleven smaller craft which they operate also.

The big jobs include the gypsy moth program in the East about which there has been so much publicity recently. Almost three million acres of woodland in southern New York, northern New Jersey and eastern Pennsylvania were sprayed this past season, and there will have to be a continuing program of one to two million acres a year as long as the gypsy moth presents a threat. If it ever gets past the natural barriers and spreads to the crop lands of the South, it could create havoc in the cotton, rice and other crops of that region, for it is an extremely destructive insect.

Spraying to control the spruce bud worm involves another one and a half to two million acres every two are three years simply as a control measure. Grasshoppers in Montana, Wyoming, the Dakotas, Colorado, New Mexico and Texas add another one to five million acres a year, the acreage to be treated annually depending on crop, weather conditions, etc.

Quite apart from the hazard involved in the flying operations, the aerial spraying business is, Mr. Hanson and Mr. Heckathorn emphasize, one of the toughest industries in which to operate efficiently and profitably. It is an extremely competitive business, price-wise, and the successful operator must have a tremendous amount of money tied up in a wide variety of high priced equipment which he must keep operating constantly if the business is to result in profits rather than losses. A miscalculation can result in severe financial penalty, as many in the business can testify.

The prime need to make the aerial spraying business safer is adequate training of personnel before they are put on their own.

There is a very short season in which to operate and the weather uncertainties limit cricically the number of hours suitable for spray operations each day. Ground facilities must be provided for mixing pesticides, loading, arrangements made for storage of fuel, refueling of planes, airstrips, etc., all of which must be set up on a temporary basis so they can be dismantled at the end of a few weeks and moved on to the next job.

If the business is a tough one for the spray contractors, it is equally hard on the flying personnel. Up at 2:00 a.m., they must be on the strip at 3:00 ready for loading and briefing. After weather reports from the field are inspected, checkers are dispatched to the fields, observation aircraft sent on their way and then just before daybreak, which may come between 4:00 and 5:00 a.m., the spray planes take off. The optimum spray time is a short and uncertain period just after sun-up. When the temperature rises to 68°, or the wind velocity gets as high as six miles an hour, the spray operation is over for that day. On a good day, the planes may fly until 9:00 or 10:00 in the morning.

When the planes get back to the landing strip all hell breaks loose. Time is of the essence and every minute of spray time is precious. As the planes refuel and take on a new load of insecticide, spending at most six or seven minutes on the ground, the atmosphere is reminiscent of a pit at the auto races.

The flying itself is physically a very hard job—managing a big, heavily loaded ship, maneuvering at a low level to clear obstructions, contouring at a level of 75 feet or dropping down below 25 feet to guarantee precise crop coverage. Over timber, of course, the planes must fly higher. The average altitude has been 75 to 250 feet until recently, but over the past year or two United-Heckathorn have been conducting tests with special equipment which may make it pos-

Left: Cleaning up C 82 19-57 after spraying Glacier Park.

Right: C 82 spraying around Lake Hamilton with one boom on to prevent chemical drift into the lake.

sible to fly as high as 750 feet and still get satisfactory coverage and kill. This would obviously make such operations much safer.

The low level at which most custom flying must be performed is, of course, one of the critical hazards in spray plane operations. At low levels, a stall automatically means a crash and stalls contribute either directly or indirectly to 45 per cent of the accidents in aerial spraying. To reduce the number of such accidents Mr. Hanson believes it would be very wise to make more use of "stall warners." He is also a firm believer in routine use of every other type of safety equipment, including hard hats, shoulder harnesses, crash pads, wire cutters, etc.

In the final analysis, however, he emphasizes that it is pilot training that is the most important factor in achieving safety in aerial spray work. Military pilots, perhaps trained in jet operation, are often at a disadvantage in custom spray work, for they have been trained in many situations to come up with what would be just the wrong answer. It takes a minimum of four years, says Hanson, to retrain a pilot for custom spray work.

Critical points in the operation of a spray plane are the take-off, the climb out, decending into the field, the spray run, manuevering around, over or under obstacles, pull-ups, turnarounds, etc. Wires extract a heavy toll, and the high rate of accidents they cause emphasizes the importance of pre-flying the job and deciding in advance just how each hazard will be dealt with when the plane is under full spray load.

The plane itself can be another hazard factor. The high wing monoplane, for example, Mr. Hanson characterizes as a death trap unless the pilot is specially trained in its safe operation. With the engine in front and his spray load behind, he is in an unenviable position in the low wing monoplane. The accident records bear this out—one fatality to 8,000 hours flown as against one in 34,000 hours in the typical biplane.

Pilot narcosis, another factor which can increase accident rates, has been

(Continued on Page 99)

Aerial Crop Control Accidents

Calendar Year	Hours Flown	Accident Rates (per 10,000 hours flown) Fatal	Non-Fatal	Total
1951	708,129	0.79	4.38	5.17
1952	707,277	0.69	4.63	5.32
1953	722,000	0.64	4.16	4.79
1954	678,000	0.80	3.88	4.68
1955	851,960*	0.63	3.09	3.72

Agricultural Flying Hours By Type of Activity — 1955*

Type of Activity	Hours	Percent of Total
Insect Control, Total	557,040	65.4
Crops, orchards, etc.	523,410	61.5
Forests	18,210	2.1
Towns	10,530	1.2
Soils	4,890	0.6
Plant Disease Control	21,840	2.6
Weed Control	87,910	10.3
Brush Control	6,700	0.8
Fertilization	62,550	7.3
Defoliation	59,390	7.0
Seeding	45,390	5.3
Other*	11,140	1.3
TOTAL	851,960	100.0

*Includes anti-frost agitation, agitating fruit trees, chasing birds from crops, checking crops and fallow land.
*Based on preliminary figures of the Civil Aeronautics Administration.

Causal Factors of Aerial Crop Control Accidents — 1955-1954

Pilot	Causal Factors 1955	1954
Failed to maintain flying speed	76	69
Failure to observe aircraft, objects	44	60
Misjudged distance	88	93
Inadequate flight preparation	28	23
Selected unsuitable terrain for landing, or takeoff	7	21
Misuse brakes, flight controls, ground	8	10
Misuse, powerplant, controls	8	9
Operating recklessly — carelessly	5	5
Failure to compensate for wind	0	4
Inattentive, fuel supply valves	4	3
Exceeded ability — experience	2	2
Cont. V.F.R. unfavorable weather	0	1
Improper level-off	3	1
Inadvertent operation of mixture control	0	1
Became lost (VFR)	0	0
Improper use of miscellaneous equipment	0	0
Other	5	6
Other Personnel	10	14
Powerplant	57	59
Airframe	6	10
Landing Gear	1	6
Equipment and Accessories	3	1
Weather	18	20
Airport—Terrain	10	12
Sub-Total	278	268

*Preliminary figure subject to revision.

Tables from "Aerial Crop Control Accidents," publication of Civil Aeronautics Board, Bureau of Safety Investigation.

Handling Pesticides—

Precautions to be observed in manufacture, formulation, and packaging of agricultural chemicals

From one of a series of articles on Toxic Hazards in Industry that appeared in *Chemical Age*. The agricultural chemicals industry is covered by Peter Cooper in the Feb. 9, 1957 issue.

RIGID safety precautions must be taken at all stages of manufacture, formulation, and packaging of modern agricultural pesticides. Many of the older arsenicals, mercurials, and halogenated insecticides remain moderately hazardous but their noxious properties have tended to be overshadowed with the arrival of more potent drugs.

In general, precautions should be taken against ingestion, inhalation, or skin contamination, and particularly where fine dusts, solutions in oily or hydrocarbon bases, or liquid compounds are concerned.

Nicotine, especially the free alkaloid, is absorbed very rapidly through the unbroken skin. A few drops of base or strong salt solution allowed to remain on the skin or clothing may prove fatal.

Nicotine poisoning calls for immediate treatment, since death may occur after only three minutes. The stomach should be washed out with dilute permanganate solution and activated charcoal given, if oral poisoning is likely. Contaminated clothing should be removed and the skin washed copiously with water. Heat should be applied to the body and cold packs to the head. Chloral hydrate or morphine is suitable for irritability or abdominal pain. Artificial respiration and oxygen inhalations may become necessary. Strychnine must be avoided but intravenous atropine sulphate may help to avert heart failure. Recovery is usually complete within 24 hours.

Warfarin, a potent rodenticide, depends for its action upon its anticoagulant properties. It causes capillary damage and multiple hemorrhages. The chief danger of contact with warfarin is the delay in effect; a single dose needs four days to produce results.

Poisoning is shown by persistent bleeding after small abrasions, and an increase in blood clotting time. Phytonadione (Vitamin K_1) may be given intravenously in emergency hemorrhage and exerts an antidotal effect in three hours, reaching a maximum in six. In serious cases, transfusions of wholeblood may be needed.

ANTU, another rodenticide of relatively low toxicity for humans, causes massive pulmonary oedema with pleural effusions. It is mildly emetic and produces shortness of breath, a fall in body temperature, alterations of hair growth and pigmentation and a marked rise of blood-sugar. Accidental doses should be treated with gastric lavage and saline cathartics and by rest in a recumbent position.

The chlorinated compounds, dicophane (DDT, 1,1,1-trichloro-2,2-bis(p-chlorophenyl)ethane) and BHC, are readily absorbed by all routes but are much less toxic than the organic phosphorus insecticides. With dicophane, central nervous symptoms may appear within an hour. Nausea, vomiting, and diarrhea are accompanied by anxiety, giddiness, somnolence, and tingling of the extremities. With large doses delirium, convulsions, and respiratory failure may follow. Serious cases of exposure to BHC develop abdominal pain, convulsions, and respiratory failure. Barbiturates are used in either case to control the convulsions, and the patient is nursed quietly and given a low fat-high protein and carbohydrate diet. No oils must be given for they increase the absorption of the compounds and adrenaline must be avoided since it increases the liability to ventricular fibrillation.

Chlordane and Toxaphene are considerably more toxic than DDT or BHC and are absorbed through the skin. They both irritate the gastro-intestinal tract and are central nervous system stimulants. If the compounds are swallowed, emetics and gastric lavage are given. Contaminated skin is washed with soap and water. Convulsions are controlled with barbiturates. Steps must be taken to protect the liver and kidneys.

The organic phosphorous insecticides, HETP, TEPP, parathion, and OMPA (octamethyl pyrophosphoramide) present a great toxic hazard to all who handle them. Their lethal doses are in the region of 15 mg. and they are absorbed by all routes. Their percutaneous absorption is facilitated by formulations with wetting agents or hydrocarbon solvents. Death from severe poisoning may occur within four hours—sometimes ten minutes. The symptoms include loss of appetite, nausea and vomiting, purging, and salivation. Headache, giddiness, loss of the power of distant focusing and depth perception, and blurred vision are followed by chest pain, shortness of breath, general weakness, excessive sweating, cyanosis, convulsions, coma, and respiratory failure. The pupils of the eyes are narrowed to pinpoints.

Swallowed spray or powder must be removed with emetics and stomach lavage. The physiological antidote, atropine, must be given in large doses, the first doses being given intravenously and later ones subcutaneously. Morphine must not be given for the pain since it increases the respiratory hazard.

A routine estimation of serum cholinesterase is the most effective check on workers handling anticholinesterase drugs. A rapid method has been devised using papers impregnated with acetylcholine bromide and bromothymol blue. These are light orange when dry, but when a drop of serum is applied the indicator turns blue in the presence of the esterase, the color being compared with a standard series of papers.

Emulsifiable Concentrates

by Arthur M. Gladstone
Nopco Chemical Co.

(Conclusion)

THE subject of compatibility, being based as it is, on fairly logical requirements, can be discussed in a straightforward matter. Concentrate dispersion, on the other hand, is the subject of much disagreement. In fact, if this disagreement received more public attention, it would undoubtedly lead to active controversy. The situation arises directly from the fact that dispersion requirements are set up as much on field needs as on arbitrary criteria. The design of a concentrate for effective dispersion in the field is surely in need of intensive study, and this study should be undertaken in the field where all the effects of water, plant structure, temperature, humidity, wind, etc., can be weighed. As this discussion of dispersion develops, the need for this kind of study will become apparent.

An ideal concentrate can be defined according to its dispersive activity as follows: (1) It should emulsify with water and with a minimum of agitation; (2) The emulsion formed should be completely stable in the spray rig; and (3) The emulsion should start to break up on contact with the plant. Like so many ideals, it is much easier to define than to achieve.

The very first point in the description is that "it should emulsify with water." In this field, "to emulsify" is to bring about an intimate and homogeneous mixture of water and a non-water-soluble fluid (the concentrate). The fine structure of this mixture is such that the aqueous phase is continuous and the non-aqueous phase discontinuous. The function of this action is to permit the division of the concentrate and, of course, the toxicant into a finely divided form, thereby giving greater coverage per unit amount of poison.

Water is used as the medium of dilution for economical reasons as well as for the reason that the use of solvent in its stead could cause phytotoxic effects. It should be remembered that solvents are used to convert the toxicants into mobile liquids. Although most of them are phytotoxic when used on plants in appreciable amounts, they have no appreciable effect when diluted down as part of the concentrate with water. The use of water as the dilution vehicle also entails certain problems that vary with the source of the water. Hard and soft water are familiar concepts and generally the troubles caused by hard water are attributed to its calcium and magnesium content. This is only part of the picture.

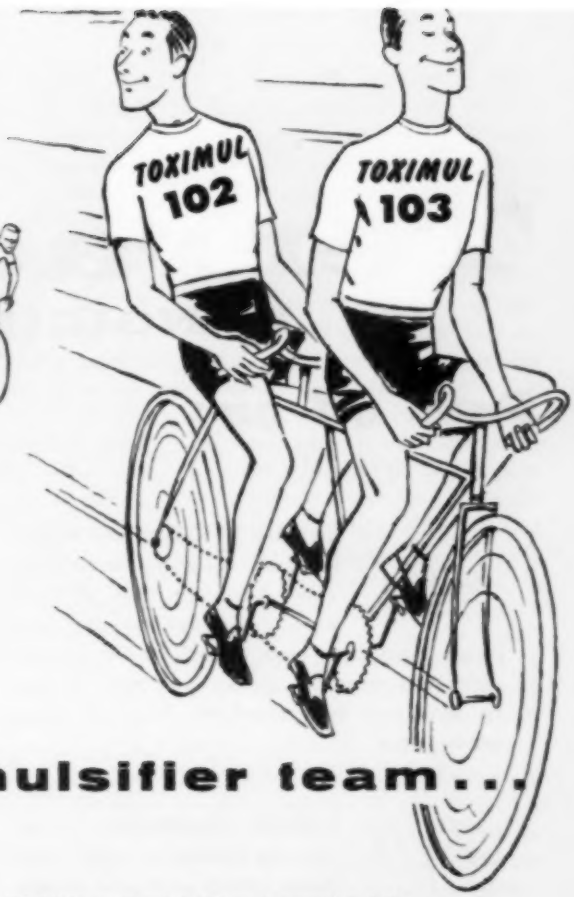
Returning to the idea of compatibility, we pointed out that an emulsifier can be considered as a molecule, part of which is compatible with the oil to be emulsified and part of which is compatible with water. Assuming this idea to be valid, then anything that interferes with these compatibilities will interfere with the emulsive action.

It is a well-known fact that the addition of a water-soluble inorganic salt to an aqueous solution of an organic material will force the latter out of solution. This is known as "salting out" and is used in modern chemical technology. The waters that are used in diluting concentrates in the field contain varying amounts of salts present as ions, sodium, iron, and others as well as calcium and magnesium. When they are appreciable, the salting-out effect apparently interferes with the emulsifier's water linkage, thereby reducing or completely destroying the emulsifier's action. The formulator must design his concentrate to cope with this salting-out effect. Those waters that are considered "hard" contain a preponderance of ions which can actually react with certain of the emulsifier ingredients, thereby destroying a part of the emulsifier's water link. This effect adds to the salting-out effect, and it too must be reckoned with in designing a concentrate.

At present, too little is known about the quantitative aspects of these ionic interactions, and solutions of problems arising from them must be achieved almost entirely by empirical research.

We come now to the second requirement of our ideal concentrate—"emulsify . . . with a minimum of agitation." The reason that this becomes a problem is that agitation varies with the complexity of the spray rig. Simple or hand rigs are agitated by hand. One can shake them if they are small enough or use relatively inefficient paddle-type agitation usually tied into the hand-pump lever. On the larger rigs, motor-driven agitation and even recirculation are available. Within certain limits (related to the constitution of the emulsifier), dispersion of an emulsifier is related directly to the amount of emulsifier used in the concentrate. Therefore, if greater dispersion properties are required for the smaller, less efficiently agitated rigs and if lesser dispersion properties are required for larger, more efficiently agitated rigs, the formulator is faced with the problem of deciding the optimum amount of emulsifier his concentrate will require to satisfy the needs of his market.

Changing the amounts of emulsifier in the concentrate, however, will also affect the other properties of our concentrate. Stability in the spray rig and on the plant are very important related considerations in using



Get ahead of your emulsifier problems

with this new emulsifier team...

TOXIMULS 102 AND 103—

completely new types of agricultural emulsifiers—will emulsify *both* chlorinated insecticides *and* herbicides with great efficiency, just by blending them in correct proportions to suit your particular formulation.

Used at concentration levels of only 2-4%, this new emulsifier pair gives flash emulsification and high stability with pesticides ranging from Toxaphene or Dieldrin to Butyl 2,4D or Isooctyl 2,4,5T.

You'll find it easy to get outstanding performance in all waters or solvents with the proper blend of TOXIMULS 102-103. Be sure of consistently good results, and less inventory problems, by putting this great new emulsifier team to work for you at once. Ask for full information without delay.

ALSO: special emulsifiers such as . . .

***TOXIMUL* 500** . . . easy-to-use "universal" emulsifier.

***TOXIMUL* MP** . . . for Malathion or Parathion.

***TOXIMUL* 250** . . . for CIPC or Pentachlorophenol.

NINOL

Detergents—
—Emulsifiers

★ *Write today for samples, data sheets . . .*

SEND THIS COUPON NOW!

NINOL LABORATORIES, INC.,
DEPT. A
PRUDENTIAL PLAZA
CHICAGO 1, ILLINOIS

Gentlemen: Please send working samples of, and complete information about the *TOXIMULS* checked:

- ☐ 102 and 103—for chlorinated insecticides and herbicides
- ☐ 500—for "universal" applications
- ☐ MP—for Malathion or Parathion formulations
- ☐ 250—for CIPC and Pentachlorophenol formulations

Signed _____

Co. _____

Street _____

City & State _____

NINOL LABORATORIES, INC.

PRUDENTIAL PLAZA • CHICAGO 1 • PHONE WHITEHALL 4-6323

In Canada: Chemical Developments of Canada Ltd., 420 Lagauchetiere Street W., Montreal 1, Quebec

Terraclor

FUNGICIDE

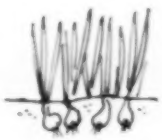
Pays off on:

COTTON: 25-30% of total disease losses are caused by seedling diseases. Replanting costs $5-15.00 per acre, plus loss of pre-emergence herbicide previously used. TERRACLOR may increase yields and return the grower more than 15 times his investment through uniform stands of better grade cotton.

CABBAGE, CAULIFLOWER: Severe club root infection can take a field out of crucifer production entirely. TERRACLOR control has provided 3-5 ton per acre increases for a return of 10-30 times the investment.

PEANUTS: Faced with the threat of a 50-60% crop loss, growers can realize TERRACLOR-increased yields of as high as 350-500 lbs. per acre of clean peanuts free from soil. This return is many times the cost of chemical invested.

LETTUCE: Growers have lost 25-50% of their crop to leaf drop and bottom rot. TERRACLOR may increase yields ⅓ to ½ and return 10-15 times the cost of treatment.



GARLIC: White rot control with TERRACLOR has resulted in increases of 20-30 sacks per acre and paid for the chemical many times over.

WHEAT: Several pennies worth of TERRACLOR seed treatment per bushel can result in smut-free yields worth up to $20 per acre.

ORNAMENTALS: Increased yields of vigorous, disease-free plants, flowers and bulbs are the return for a few pennies invested in TERRACLOR soil and bulb treatments.

FORMULATORS—Get complete information on the new soil fungicide TERRACLOR (PCNB) for control of soil-borne diseases. It is available as 75% wettable powder and technical grade. Call or write today.

Terraclor

TERRACLOR® is a trademark

OLIN MATHIESON CHEMICAL CORPORATION
INSECTICIDE PRODUCTS DEPARTMENT • BALTIMORE 3, MD.

3676

MATHIESON

Aldrin • BHC • Chlordane • DDT • Dieldrin • Endrin • Ferbam • Heptachlor • Lindane • Malathion
Omazene® • Parathion • PCP • Phosdrin • Phytomycin® • Rotenone • Seed Protectants • TEPP

emulsifiers. Once the spray operation is started, the spray emulsion must be kept uniform while it is in the tank. If the spray operation has to be interrupted for any period of time and the agitation is stopped, an unstable emulsion will start to layer out. This is not serious in the larger machines, for their efficient agitation will quickly reconstitute the spray emulsion. It can become serious, however, to the point of causing damage if at least one of two factors is present.

With regard to the first factor—if the rig has inefficient agitation, so that the spray emulsion is not completely reconstituted, the resulting spray will vary in its concentration. One result will be plant damage caused when the spray is composed of the concentrated layer's carrying most of the toxicant and solvent. Another result will be incomplete protection caused when the spray is composed of the less concentrated layer's being made of water with too little toxicant dispersed in it.

The other factor can cause the same effects even with efficient field agitation. Under certain circumstances, many emulsifiers will permit an emulsion to break "irreversably" (invert). When this happens, a separation of layers takes place but the layer containing most of the toxicant and solvent reverses to a water-in-oil emulsion. In the field there is no practical way of reconstituting the original spray emulsion from this.

There is another factor involved in the emulsifier-agitation relationship and that is foaming. If the concentrate foams when it is mixed with water in the spray tank, the operator has to:

1. Be satisfied with a partially filled tank and make extra trips for refills, or
2. Let the foam overflow if he wants the tank completely filled with liquid. This is dangerous, if the toxicant is particularly deadly, and wasteful, since some of the concentrate is contained in the foam, or
3. Slow the filling process to the point where the agitation of filling causes little or no foam. This may be economically impractical because of the extra time required. In many high pressure rigs, foaming can cause considerable entrapment of air in the spray. This will result in less coverage than that for which the rig was calibrated, and it will interfere with the spray pattern that the nozzles were set to deliver.

Aqueous foams, such as we are discussing, can be attributed mainly to the emulsifier or other surface active ingredients incorporated in the concentrate. The formulator must therefore evaluate and consider the foaming properties of the emulsifier and other ingredients. In concentrates that may be used in low volume rigs, this becomes especially important. Low volume dilutions of concentrates result in appreciably higher concentrations of emulsifier in the spray. It will usually be found that this will magnify foaming problems.

Although not truly related to this part of the discussion, there is another type of foam of which the formulator must be aware if he is to avoid its presence in the concentrate he designs. Occasionally non-aqueous concentrates will foam when agitated. Although this type of foam does not usually interfere with application, it can hold up formulating plant operations. When drums are being filled for shipment, excessive foaming will prevent rapid filling to proper weight requirements. Again, escape of such foam constitutes a needless hazard to the plant personnel. In this case, any or all of the concentrate ingredients may be suspect, making the elimination of this foaming an intricate problem.

The final requirement in our definition of an ideal concentrate is concerned with the stability of the emulsion after it leaves the rig. Directly related to this is the particle size of the oil phase. As long as the spray is a very stable emulsion, each toxicant-containing oil particle is surrounded by the continuous water phase. In contacting the plant superstructure, the effect is essentially that of aqueous wetting. Most plants are coated in various degrees with waxes or oils which are hydrophobic and tend to repel water. The result is that an appreciable portion of the spray balls up on the leaf and runs off. The toxicant in the run-off is no longer available for protecting the plant.

One way of reducing run-off is to design the emulsion so that it inverts or at least layers out on the plant. This is a difficult thing to achieve because it is beset by a danger. When layering out on the plant results from the coalescing of smaller particles to form larger particles, less area can be protected by the toxicant. (When the particles are small enough, Brownian movement for one helps to keep them suspended—larger particles settle much more rapidly because their mass is gross as compared to the molecular momentum involved in Brownian movement.) At the same time, more toxicant and the accompanying solvent are concentrated on a limited area of leaf. Carried far enough, this will result in the plant's suffering chemical burning.

In the ideal situation, the spray emulsion would invert without coalescing upon hitting the leaf and we should then have more uniform coverage. The oil phase (which is now continuous while the aqueous phase is discontinuous) would bring about more intimate contact of the toxicant with the plant by more completely wetting the hydrophobic waxy layer on the leaf.

Since all spray emulsions coalesce, how small a particle size should an emulsion have when it hits the plant so that coalescing will not bring about plant burn? Even more important, what is the effect of spray emulsion particle size on control of pests in the field? Definitive answers may be forthcoming, but the writer is not aware that they have arrived to date.

To add further complexity to the emulsifier problem, emulsifiers and other surfactants can lower surface tension. The problem of run-off could be reduced by lowering the surface tension of the continuous aqueous phase, thereby increasing the wetting of the leaf; but lowering surface tension can increase foaming. By using an inverted spray emulsion in the first place we might also reduce run-off, but this can also increase the

(Turn to Page 99)

Fertilizer Views and News

Dr. Vincent Sauchelli

Dr. Sauchelli is the agronomist for the National Plant Food Institute.

Trends In Fertilizer Ratios— Is The 1-1-1 Ratio The Ultimate?

ACCORDING to the latest official report on fertilizer consumption in the United States and territories, the total consumption of all fertilizers in the 1955-56 season was 22,726,462 tons of which 21,403,465 tons comprised products containing one or more of the primary nutrients (N, P_2O_5, K_2O). The total consumption of mixed fertilizers was 14,775,563 tons or 66.58% of the total quantity. The report shows that 1,536 grades were consumed in individual amounts of 3,000 tons or more. These amounted to 96.17% of the mixtures or 13,973,318 tons.

It is interesting to note further that four ratios of the primary nutrients (N_2O_5, K_2O) represented 50.63% of the total consumption of the mixed fertilizers. These were as follows:

Ratio	Tons Consumed	Percent of Total Mixed Fertilizers
1:4:4	2,531,259	17.42
1:2:2	2,017,105	13.88
1:1:1	1,578,374	10.86
1:3:3	1,230,328	8.47
	TOTAL	50.63

Hence, while 171 grades accounted for 96.17% of the total tonnage of mixed fertilizers, 15 of these grades accounted for 62.56%. In 1955-56 the 5-10-10 grade was consumed in largest quantity whereas in the previous 6 years it was the 3-12-12 grade that sold in largest tonnage.

Frequent statements are seen in the press to the effect that the average ratio of fertilizer consumed in the United States is tending toward the 1:1:1 ratio. Agronomists in many areas have a tendency to recommend that the ratio of phosphate *application should be reduced* because the phosphate level of the soils in their community is rising. These recommendations to reduce the P_2O_5 may be in-

*Fertilizer Consumption in the U. S. by W. Scholl and Assoc., U.S.D.A., June, 1957.

direct, as for instance, the agronomist suggesting that the formulations of mixed fertilizers should be revised to provide more nitrogen and potash and less phosphate.

It might be suggested that if the level of soil phosphorus is happily on the high side, the proper recommendation should be not to reduce the rates of application of phosphorus, but rather to increase the rates of application of the nitrogen and potash. This is not the same thing as changing the ratios. That farmers throughout the country seem to prefer overwhelmingly the ratios 1:4:4 and 1:2:2 and 1:3:3 as noted from the record previously seems to be significant. If the change to the 1:1:1 ratio is sufficiently significant as to be designated a "trend," the official figures do not support such an interpretation.

New Crops—New Fertilizer Markets

AT a recent meeting in Florida sponsored by Citrus and Chemurgic groups I was once more impressed with the potential resources of the Southeast, as yet untapped by industry, but promising rich rewards to enterprising industrialists. Several research leaders associated with local firms listed the number of substances already being profitably derived from the citrus crops other than the juices and pointed out the large number of other organic derivatives potentially present in this crop alone. Others described the local advantages for developing new fiber crops, such as ramie and kenaf. Farm crops are rich in cellulose, proteins, starch, sugar, oils and other compounds, all of which could become sources of raw materials for chemical manufacturers.

Although farm crops are generally grown for food and feed purposes, it is a fact that half their bulk is inedible. This fact has stimulated many thoughtful persons to advocate that the federal government should sponsor research aimed at showing how the chemical industry could utilize this huge tonnage of raw materials in the interest of conservation and farm prosperity.

It is known, of course, that a beginning along this line was made in 1948 when the Congress authorized the establishment of four regional research laboratories. These research centers have developed some 400 important processes, of which about 300 are awaiting favorable economic conditions for commercial adoption. But, the Congress has at no time provided sufficient annual funds to these laboratories to enable them to carry on as originally hoped for.

Last June the 84th Congress created a Commission that was to investigate and report on the possibility of utilizing farm crops for industrial use. Its report has been published as Senate Document No. 45.

The fertilizer industry is naturally interested in the success of any development of large acres of new crops in whatever the region of the country. In the Southeast, vast acreages have been withdrawn from cotton growing and await a new paying crop. Kenaf could be one new crop to replace cotton on those abandoned acres. New crops create new markets for commercial fertilizer and constitute the soundest method for expansion of fertilizer usage.

IN all activities on the farm, one factor, for good or ill, stands out as a most decisive influence. You've guessed it—the weather. In season and out of season, this factor creeps in all the news about the crop situation. Listen to some typical reports of recent vintage:

> "Excessive rainfall has dealt many farm families a severe blow. A large area from northern Texas to central Ohio suffered ruined or damaged crops from excessive rains."
>
> "Severe drought damaged crops along the Atlantic seacoast from North Carolina to Massachusetts.
>
> Heavy storms at harvest time caused severe losses in some of the principal winter wheat areas."
>
> "The Southwest has had substantial snow or rain and many fields which had steadily deterioriated now have a favorable outlook. Relatively little acreage has been completely lost so far from drouth or wind erosion, but more rain or snow will be needed to overcome the soil moisture deficit."

And so it goes. We can use every device and skill known to science to improve variety, soil structure and fertility, so as to increase quality and quantity of the harvest, but without favorable weather, man's efforts become frustrated. This past season despite the soil bank and allotted acreage, the weather favored abundant harvests in areas sorely hit by the weather in the previous several years.

The expectation is that the 1957 harvest may turn out to be the greatest yet—a new high record for this country.

"What is it moulds the life of man?
The weather.
What makes some black and others tan?
The weather.
What makes the Zulu live in trees,
And Congo natives dress in leaves
While others go in furs and freese?
The weather.
What makes some glad and others sad?
The weather.
What makes the farmer hopping mad?
The weather.
What puts a mortgage on your land
That makes you sweat to beat the band,
Or takes it off before demand?
THE WEATHER."—

—W. J. Humphrey

NPFI Presents Soil Builder Awards To Agricultural Editors

Ralph D. Wennblom, associate editor of the *Farm Journal*, Philadelphia, and the staff of The *Georgia Farmer*, were honored last month as the nation's outstanding agricultural writers who most effectively have carried messages of soil building to their farm magazine readers.

The Soil Builders Award for Editors plaques were presented by the National Plant Food Institute at the annual meeting of the American Agricultural Editors' Association at the Conrad Hilton hotel in Chicago, Dec. 4.

Mr. Wennblom was honored as the winning writer among magazines with more than 300,000 circulation and Tom Anderson of Nashville, Tenn., publisher of the *Georgia Farmer*, received the award on behalf of his staff winner in the category of magazines with less than 300,000 circulation.

Phosphoric Acid

of High Concentration

SUPERPHOSPHORIC acid is a relatively new raw material for the fertilizer manufacturer which has been developed over the past few years by the Tennessee Valley Authority. In a paper delivered before the American Chemical Society at the September, 1957, meeting, M. M. Striplin, Jr., D. McKnight and G. H. Megar of TVA, Wilson Dam, Ala., gave details on the historical background of this new phosphoric raw material, told how TVA has modified one of its plants for its production and listed some of the characteristics of the material which make it particularly suitable for use in various types of liquid and solid fertilizers.

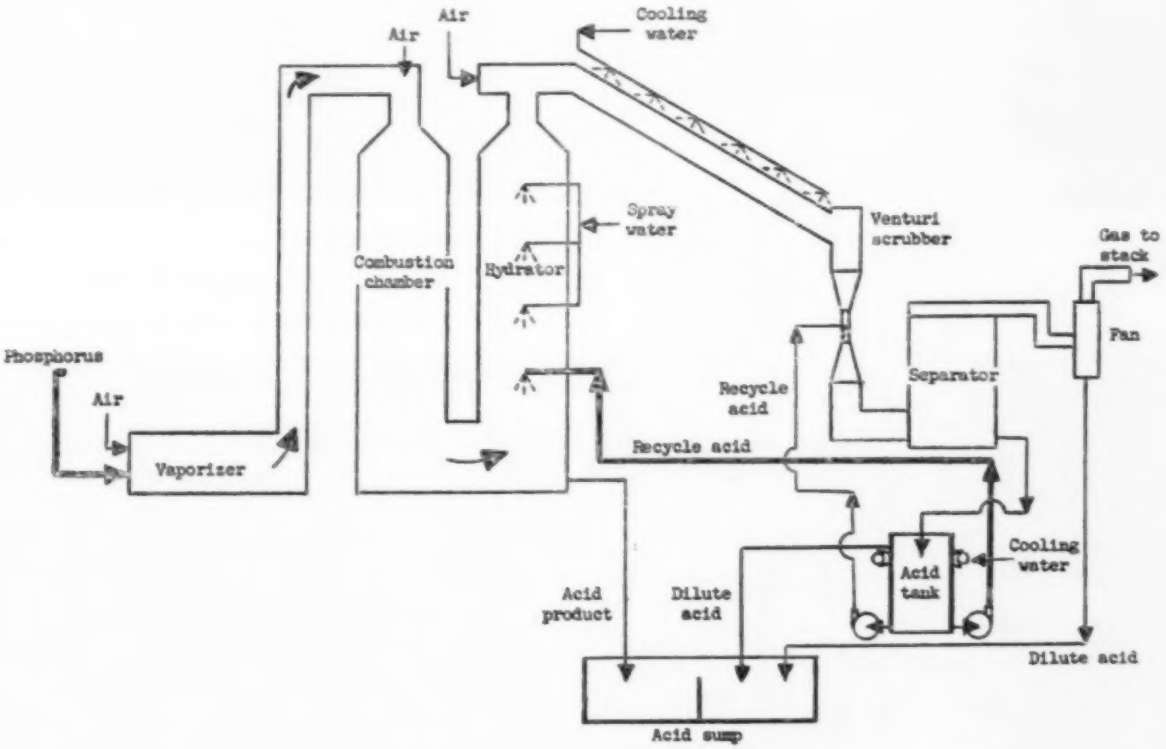
TVA research workers have studied the characteristics of strong phosphoric acids over a period of several years, and recently concluded that acid containing 76% P_2O_5 offers substantial advantages over acids of either lower or higher concentration. Acid in the range of 75 to 77% P_2O_5 remains liquid at temperatures low enough so that it can be shipped or stored in tanks exposed to the weather, while acid in the range of 60 to 75% P_2O_5, or from 77 to 83% P_2O_5, crystallizes at normal temperatures.

Another important superiority of superphosphoric acid (containing 76% P_2O_5) is that it is substantially less corrosive to metals and alloys than ordinary phosphoric acid. The corrosion rate of mild steel in contact with super phosphoric acid was only about half that of ordinary acid. The effects of superphosphoric acid on plastics and rubber materials are still under study by TVA, since it seemed possible that the more concentrated acid might lead to more rapid deterioration of these materials. Several rubber and plastic materials appear to be satisfactory for use in contact with acid at room temperatuure.

The first superphosphoric acid was made from phosphorus in a plant designed for production of ordinary phosphoric acid by operating the plant at a higher temperature. Subsequently operation of the plant was modified to provide for recycling the dilute acid. Thus the superphosphoric acid could be made without the necessity of operating at excessive temperatures and avoiding the problem of increased corrosion of equipment. The accompanying illustration indicates the process and the flow of materials through the various elements of the plant, which consist primarily of a vaporizer, a combustion chamber, a hydrator and a scrubber-separator.

TVA has made limited quantities of superphosphoric acid available to fertilizer manufacturers for experi-

(Continued on Page 97)



LISTENING POST

By Paul Miller

This department, which reviews current plant disease and insect control problems, is a regular monthly feature of AGRICULTURAL CHEMICALS. The comments on current plant disease problems are based on observations submitted by collaborators of the Plant Disease Epidemics and Identification Section, Horticultural Crops Research Branch, United States Department of Agriculture, Beltsville, Maryland.

Effectiveness and Phytotoxicity of Some Materials Tested for Use as Seed Treatments to Control Bacterial Wilt of Sweet Corn

LANSING E. Williams, of the Ohio Agricultural Experiment Station, reports* results of experiments to determine the effectiveness of several different antibiotics and other chemicals as seed treatment materials for the control of Stewart's bacterial wilt of sweet corn, caused by *Bacterium stewarti*. Seeds of Golden Bantam sweet corn that had been soaked for 20 to 24 hours in water solutions or suspensions of the test compounds (Table 1) or, for the controls, in water alone, were planted in flats in the greenhouse. Temperature was kept at about 28° C. When the seedlings were at the two- to three-leaf stage, they were clipped at the coleoptile level and sprayed with inoculum made from 2- to 3-day-old cultures of the causal bacterium suspended in distilled water. Severity of infection was estimated about a week after inoculation when new leaves had grown. Rating was on a scale of 0 to 5, with 0 representing a healthy plant and 5 a dead one. Treatments were replicated five times and a control row was included in each flat.

Effectiveness of Control: Six of the materials tested, in three experiments, gave significant control. These were sodium borate (borax), indoleacetic acid (IAA), 2,4,5-trichlorophenoxyacetic acid (2,4,5-T), terramycin, streptomycin, and tetracycline.** Table 1 gives results of the third experiment.

All of the effective materials were phytotoxic, especially at the higher concentrations. Phytotoxic effects of the antibiotics included chlorosis and stunting, and terramycin in addition caused "leaf-stringing." A

*Lansing E. Williams, "Effects of some materials on Stewart's bacterial wilt of sweet corn when applied as seed treatments," Plant Disease Reporter, vol. 41, no. 11, pages 919-922, Nov. 15, 1957.

**Streptomycin STS (54% streptomycin base) supplied by Merck and Co., Inc.; soluble terramycin (21% terramycin base) by Chas. Pfizer & Co., Inc.; 2,4,5-T by Monsanto Chemical Corporation; and tetracycline HCl by Bristol Laboratories.

Table 1. Severity of bacterial wilt in sweet corn seedlings from seeds soaked in water solutions of indicated chemical compounds.

Material	Concentration ppm	Index of[b] disease severity	Percent of plants diseased
Streptomycin	500	0.16*	17*
	250	0.28*	27*
	125	0.36*	34*
	62	0.45	45
Control	—	0.71	55
Tetracycline	2000	0.00**	00**
	1000	0.10**	19**
	500	0.25**	31**
	100	0.82	57
Control	—	0.91	68
Terramycin	500	0.08**	9**
	250	0.24**	27**
	125	0.68	49
	62	0.67	51
Control	—	0.67	49
IAA	2000	0.02**	8**
	1000	0.18**	14**
	750	0.50*	34*
	500	0.50*	32*
Control	—	0.80	58
2,4,5-T	500	0.08**	9**
	250	0.24**	27**
	125	0.63	49
	62	0.67	51
Control	—	0.67	49
Sodium Borate	2000	0.26**	24**
	1000	0.28**	22**
	750	0.64**	45*
	500	0.98	56
Control	—	1.01	63

**Statistically different from the control at the 0.01 level
*Statistically different from the control at the 0.05 level
[b]Derived as the mean of the ratings of plants arising from 5 replications of 20 seeds each.

few plants from seed treated with the higher concentrations of the antibiotics were completely chlorotic. Treatment with sodium borate resulted in a chlorotic-streaking of leaves of seedlings. Injury from 2,4,5-T was evident in reduced germination and in stunting of the seedlings. Except possibly for a slight stunting, IAA did not seem to cause damage to seedlings.

Effect on Stands: In an experiment to determine whether the test materials affected survival of the plants, four replications of each treatment, with 100 treated seeds each, were planted in randomized plots in the field. Number of living plants and evidence of injury were recorded about 45 days after planting. Incidence of the disease was too low for disease ratings. Results of this experiment are shown in Table 2.

Stands were lower than in the control rows in all treatments except the lowest concentrations of sodium borate and IAA. If wilt killed a larger number of young plants in the controls than in the other treatments, the stand losses from phytotoxicity may have been larger than the counts show. However, the fact that wilt incidence in mature plants was low indicates that few young plants were killed by the disease.

Discussion: Penetration of the treatment materials into the seed is affected by seed coat injury, which is common in mechanically processed seed corn, and the condition of the seed coat may explain differences in the effects produced in seedlings from different seeds of the same treatment lot. The variation from slight to complete chlorosis in seedlings from seeds soaked in the same antibiotic solution also may be associated with amount of seed coat injury. In general, the most chlorotic seedlings showed greatest wilt resistance. It is not known whether wilt resistance is related to concentration of the test material in the host plant, or to the severity of the chlorosis.

At present, because of their phytotoxicity at effective concentrations, these materials do not seem promising for use as seed treatments to control bacterial wilt of sweet corn. Nevertheless, their capacity for penetrating the seeds, moving into the seedlings, and preventing the development of wilt is significant. New compounds or similar ones, or different formulations of these same materials, might be developed that would be either or both more effective in controlling the disease and less phytotoxic.★★

This column, reviewing current insect control programs, is a regular feature of AGRICULTURAL CHEMICALS. Mr. Dorward is head — Plant Pest Survey Section, Plant Pest Control Branch, U. S. Department of Agriculture. His observations are based on latest reports from collaborators in the U.S.D.A.'s pest surveys throughout the U. S.

By Kelvin Dorward

Outstanding Insect Notes

THE **Mediterranean fruit fly** eradication program in Florida continues very encouraging. The only fruit flies captured since September were four on November 6 in Manatee County and two on November 26 on Sneads Island of the same county. Evidently the source of infestation exists in wild guava in the Manatee River area. The initial spraying of the area in the vicinity of the November 6 find had been completed by the last of November and was initiated in the area of the November 26 find immediately. In Hillsborough County bait spraying has been completed and the area was released from quarantine November 5. This leaves Manatee County the only area in Florida under quarantine for the Mediterranean fruit fly. An aggregate of more than 6,747,000 acres had been treated by November 30, 1957, under the Federal-State cooperative program to eradicate the pest.

The **spotted alfalfa aphid** was reported in late October from Ohio for the first time. Light populations were recorded in Hamilton and Brown Counties with the easternmost record being near Higginsport. All infestations were from areas close to the Ohio River.

In the treatment-detection **Mexican fruit fly** program of southern California and Baja California, and Sonora, Mexico, trapping results continue to be negative. No Mexican fruit flies have been taken since July in southern California and none in Baja California, and Sonora, Mexico, since August.

Boll Weevil Hibernation Counts High in Mississippi

THE first report on the fall survey, to determine the number of **cotton boll weevils** entering hibernation, was received from Mississippi. An early killing frost on October 25 and 26 made possible the samples early in November. Each sample consisted of two square yards of surface woods trash, and was taken from 7 or 8 locations in each county. A total of 360 samples were collected from four areas in the state. Each area was comprised of four counties. Live weevils were found hibernating at the following ratio per acre: Lower delta 5243; central delta 6269; north delta 11,264, and the hill section 4087. The average number of live weevils per acre for the state was 6716 compared with 2091 in 1956 and 5054 in 1955. The range in numbers per location was from zero to 85,498.

Fire Ant Eradication Program

A PROGRAM with its ultimate aim of eradication of the imported fire ant (*Solenopsis saevissima richteri*) is now under way in the southeastern part of the United States. The insect was first identified in this country in 1930 from specimens collected in the vicinity of Mobile, Alabama. Indications are, however, that the pest may have been established in the United States earlier than 1920.

The ant is known to be in 171 counties of the 9 southern states of Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina and Texas. The infested area comprises about 25,000,000 acres. The heaviest areas of infestation are in Alabama with 40 known infested counties; Louisiana, 32; Georgia, 26; Florida, 12; and Mississippi, 41. The number of mounds vary from widely scattered along roadsides and right-of-ways to over 100 mounds per acre in some fields and pastures of the more heavily infested States.

The present undertakings have been made possible by the Second Supplemental Appropriation Act of 1958 which provided $2,400,000 to the United States Department of Agriculture to begin, in cooperation with the States, counties, municipalities and property owners, a fire ant eradication program. Several of the affected states have appropriated an aggregate amount of approximately $1,000,000 to combat the pest. The objectives of the cooperative program are to prevent further spread of the pest, to locate all existing infestations and to progressively eradicate the pest.

At present, dieldrin and heptachlor are generally accepted as the most effective materials for use in the eradication program. Effective results have been obtained by the broadcast application of these materials as a 10 per cent granular mix applied at the rate of 20 pounds per acre.

The program was initiated during November with insecticide applications being made in Louisiana and Georgia. Work was to begin at an early date in Alabama.

A hearing was held at Memphis, Tennessee, November 19, to consider a proposed Federal-domestic quarantine on account of the imported fire ant. Nearly 100 persons attended the hearing, including Federal and State regulatory authorities; representatives of canning companies, nursery and transplant associations, forest industries; and other interested individuals. The quarantine would be limited to the states known to be infested. Before it becomes effective the evidence presented at the hearing must be reviewed and the decision of quarantine determined. If it is decided to quarantine, the notice of quarantine will be published in the Federal register.★★

Ohio Pesticide Institute Meets in Columbus

THE use of chemicals in farming was seen as one of the greatest steps forward in modern agricultural history by Dr. H. C. Young, chairman of the department of botany and pathology at the Ohio Agricultural Experiment Station, Wooster, who spoke at the winter session of the Ohio Pesticide Institute held in Ohio, Nov. 20 and 21.

Dr. Young said that pest control is the answer to people who worry about too little food to feed more and more people in America. The emphasis on insect control is going to be progressively greater, he said. We are running into fantastic increases in yields when we control root diseases and nematodes. In strawberries the yield has been upped four times, according to Dr. Young.

Dr. Young attacked misleading recommendations coming out in the press on the control of tree diseases. We have not found a systemic insecticide that can cure tree diseases, he said, although workers are looking for antibiotics that will do the job. A DDT spray that will control the elm beetle is still the best control we have for both Dutch elm disease and phloem necrosis, said Dr. Young. He reported a tremendous amount of work is being done in the U.S., Holland and England to find resistance in the American elm to Dutch elm disease.

More than 130 chemical company representatives and researchers attended the session at the meeting.

R. E. Althaus of Merck and Co., Rahway, N. J., forecast that gibberellic acid will "take its place along with insecticides and fungicides as tools of agriculture." Some of the most understanding effects have been in cotton fields, where production has been increased by two to three more bolls per plant—or a half bale more an acre, according to Mr. Althaus. The chemical has also shown promise of increasing the yield of celery. It is this aspect of gibberellic acid—the ability to promote vegetable growth—that is most striking, Mr. Athaus said.

The Miller Bill has made a great impact on agriculture, the audience was told by Samuel Alfend, chief of the Cincinnati District of the Food and Drug Administration. Mr. Alfend said that his agency is more strict on the appearance of a pesticide in milk than in any other food. In the last FDA milk survey made in Ohio, however, no insecticide or antibiotic was found out of 44 samples, Mr. Alfred reported.

Seizures by the agency in recent years have included spinach, lettuce, wheat, barley, green coffee, peas, beans, corn, and celery where growers have failed to observe dosages or application instructions on the labels for a number of pesticides, Mr. Alfend declared.

The FDA official said that in 1958 he and his co-oworkers will talk with state extension and research workers to find out where the greatest dangers lie in the use of pesticides. Samples will also be collected at certain farms and a check made to see if spraying schedules are being adhered to.

Dramatic increases of spittlebug number, doubling and tripling in many areas, were reported by C. R. Weaver, entomologist at the Ohio experiment station. Although benzene hexachloride is a satisfactory material for its control, Mr. Weaver says he is forced to recommend less effective insecticides on forage crops since BHC has not yet been approved.

Dr. E. K. Alban, experiment station horticulturist, said that we can expect to see extended use of

(Turn To Page 95)

WASHINGTON REPORT

By Donald Lerch

SECRETARY Benson is ready to pull the cork on acreage restrictions, lower price supports, and let the forces of the market place operate more freely to establish the price of basic commodities.

Many leading farm state congressmen say no! Thus the battle will be joined, and the outcome will influence the future course of agriculture and its use of agricultural chemicals.

Farmers this reporter has talked to from coast to coast, freely state that one of the reasons they use so much fertilizer is to get the maximum production on the number of acres permitted for crop production under the government's acreage control program. To some extent this is true for the use of pesticides. Now let's suppose that acreage restrictions are eliminated—how much will this influence farm purchases of fertilizer?

The argument is made that the amount of fertilizer used would be reduced. On the other hand, most observers seem to feel that while less fertilizer might be used per acre, the total amount would be increased as farmers would seize upon the opportunity to boost their incomes by producing the maximum. Also since the freedom to plant would be coupled with the prospect of lower prices, there would be an even greater need to reduce the cost of production by increasing the yield.

Pesticide application is usually related more closely to insect outbreaks, however progress made by industry to acquaint farmers with the advantages of using pesticides regularly for the control of soil insects and the like, might well show up in increased consumption under the "right to plant" program.

Coupled with the "plant as you please issue," is the plan to speed the movement of farm peoples to the cities. This gives added proof to the proposition that if you live long enough, you see every trend reversed and then repeated. The drive to get farm people to move to the cities is a reverse of the program in the depression days of the 30's to move people from the cities out to the farm. You and I both wonder what these advocates would say if large-scale unemployment develops in industry.

However, economically there are at least two million people in agriculture who are "under-employed," that is, their farm operations are not sufficiently developed to provide a decent standard of living. Washington, along with several private economic study groups, believes that the larger farmers would greatly benefit by the removal of this "nuisance production." This seems possible because 2 million 600 thousand farmers sell less than 10% of the total farm marketings. Whereas a different 2 million 100 thousand farmers produce 91% of the total farm production that reaches market. Economically the problem is rather simple. However, measured in political and human values, it continues to defy solution.

At this moment, it's anybody's guess, but out of the heat of battle come increased support for "self-help programs" whereby farmers producing a given commodity would undertake to control their own production and pricing, thereby relieving tax payers from price support expense. The broad theory behind this approach is that farmers can do more for themselves than the government which is constantly torn by political pressure. Movements in the direction of self-help plans would favor the commercial-type family farmer and would put the buying of agricultural chemicals closer to a business investment basis.

In perspective, the farm issue at present dates back 25 years, and, according to some estimates, has cost 25 billion dollars. Yet none of the basic problems of over-production, instability of farm income, and chronic poverty of some farmers have been solved. Hope springs anew in 1958!

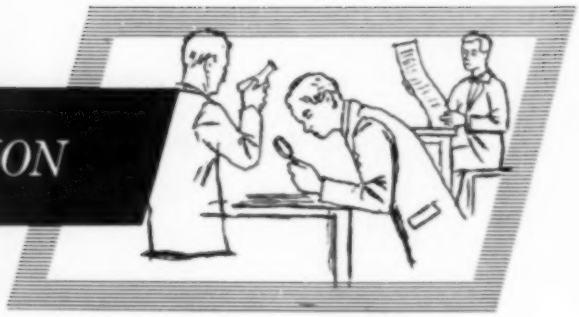
* * * * *

The welcome home theme is much in evidence as the potash industry joins the National Plant Food Institute's expanded program to boost fertilizer consumption. Over and above the dollars involved, is the strengthening of the institute's position as a vehicle for carrying out its role in the overall fertilizer industry. Washington especially is very conscious of the percentage of membership claimed by an organization. The weight of a trade association is closely related to the percentage of its industry included in membership.

This reporter has attended many Congressional hearings where the composition of a trade association's membership is very closely examined by members of Congress. The opposition to any trade association's program will seize upon this as a means

(*Turn To Page* 96)

TECHNICAL SECTION



Application of Fertilizers In Irrigation Systems

CONTINUAL feeding of crop plants by applying fertilizers with irrigation by sprinkler systems is reported to be effective in an article* by R. H. Sciaroni, L. J. Booher, and B. C. Sandlin. The tests were conducted over a three year period in San Mateo County, California, where about 6,000 acres—planted primarily to flowers, and pastures,—are irrigated with portable sprinklers.

Nitrogen, phosphorus and potassium are the fertilizers applied most commonly to the soils of the county. (Practically all irrigated crops planted along the coast need nitrogen fertilization for maximum quality and yield. A number of crops respond to phosphorus and certain crops to potassium).

Messrs Sciaroni, Booher and Sandlin, report that the injection of fertilizers into the sprinkler system is easily accomplished, and in many cases is less costly than side dressing or broadcast treatment. Most nitrogen compounds, they point out, including ammonium sulfate, ammonium nitrate, calcium nitrate and urea—are readily soluble in water and can be injected into a sprinkler system when dissolved completely. Injection of anhydrous ammonia or nitrogen solutions containing free ammonia is not practical because of excessive losses of ammonia into the air.

Most potassium salts are water soluble and can be applied by a sprinkler system; however, these fertilizers are generally applied before or during planting. Phosphorus compounds are only slightly soluble—except phosphoric acid and ammonium phosphate—and are especially corrosive to brass and bronze fittings. It has been found, also, with some crops, that placement of phosphate at the time of seeding is important. For example, band replacement of phosphate near the seed of lettuce, onions, sweet corn, cole crops, and peas produces better results than broadcast applications.

"Experience with sprinkler fert-irrigation in San Mateo County has shown that there is little hazard in corrosion of aluminum pipe or brass and bronze fittings when the fertilizer solution is in the sprinkler systems during the applications periods only, and the systems are rinsed immediately with clear water.

The fert-irrigation equipment in general use in the county consists of an air tight pressure tank connected to a Ventura unit placed in the main line pipe. When the sprinklers are operating, water circulates from the pipeline into the tank and back into the pipeline. By this method the fertilizer solution can be mixed with the irrigation water. A commercial fertilizer injector—which makes use of this principle—can be installed as permanent equipment near the discharge pipe from the pump or can be made portable. The Ventura unit is available in different sizes and can be coupled between two lengths of portable sprinkler pipe.

Another commercial injector also makes use of an airtight pressure tank for holding the fertilizer solution. The tank is connected to a Pitot unit placed in the main line pipe, which causes the water to circulate through the tank. Neither of these two units has any moving parts. A separate power unit is not required to inject the fertilizers into the sprinkler lines.

*Sprinkler Fertilizing System, *California Agriculture*, October, 1957, page 6.

•

Controlling Pests Of Rice

How to control insect pests of stored rice under present day handling and storage practices by using modern insecticides in a manner to prevent undesirable or illegal insecticidal residues was reported last month by the U. S. Department of Agriculture.

The report shows that there are over 30 species of insects infesting stored rice and rick products. Most destructive to rough rice are the lesser grain borer, the rice weevil, and the Angoumois grain moth.

A free copy of *Controlling Insect Pests of Stored Rice*, Agriculture Handbook 129, may be obtained from the USDA, Washington, D. C.

•

Solubility Not A Factor

Recent fertilizer investigations in the Kansas agricultural experiment station have shown no definite relationship between the degree of water solubility of phosphorus in the fertilizers, and the yield of oats produced, according to Floyd Smith, soils professor at Kansas State College Manhattan, Kans.

In a trial at the Ashland agronomy farm near Manhattan a fertilizer in which only about a fourth of the phosphorus was water soluble produced a greater increase in yield than one in which three-fourths of the phosphorus was water soluble.

Test Granulated Insecticides

Tests conducted in western South Dakota in 1956 showed that the granulated forms of dieldrin and heptachlor provided as effective control of the alfalfa weevil as the emulsifiable concentrated forms of these insecticides. It was also shown that the granulated forms, applied in mid-March on a light snow cover, gave as effective control as the same insecticides applied as sprays at the early-growth stages of the alfalfa in mid-April.

The granulated forms of the two insecticides tested were effective when applied with two types of normally available farm equipment, eliminating the need for an additional investment for equipment for this purpose. The use of this equipment and the granulated insecticides tested were found to be practical at temperatures too low for using field type sprayers. The rancher or farmer may thus control the weevil by applying the insecticides at a time of the year when the time expended will not conflict with the needs of other equally essential early spring field work. R. J. Walstrom and J. A. Lofgreen, *J. Economic Entomology*, 50, No. 5, Oct. 1957, pp. 574-5.

•

Preventing Ammonia Toxicity

Experimental work has indicated that the toxic material which sometimes causes injury to tobacco seedlings in beds prepared with granular calcium cyanamid in Kentucky is ammonia. In tests conducted by William A. Seay, Kentucky Agricultural Experiment Station, Lexington, Ky., organic matter and 20 per cent superphosphate additions have improved plant growth.

To determine whether the sulfur in superphosphate was responsible for the improved plant growth, some plots in the tests received sulfur and also sulfate treatments but one pound of superphosphate per square yard was used. These treatments resulted in poor stands of plants.

Various rates of superphosphate, concentrated superphosphate, and calcium metaphosphate were applied to burley tobacco plant beds prepared with calcium cyanamid. There was no difference in the number of settable plants produced from plots receiving two, three, or four pounds of superphosphate per square yard. Neither concentrated superphosphate nor calcium metaphosphate treatments were very effective in preventing plant injury from ammonia produced by the calcium cyanamid, indicating that calcium rather than phosphorus is important.

More research and test demonstration work is needed and is underway at the Kentucky Agricultural Experiment Station, according to Dr. Seay who says that it appears that 1½ pounds of granular calcium cyanamid and two pounds of ordinary superphosphate per square yard will be more successful on heavy silt loam soils for tobacco plant beds than where less superphosphate is used. These beds should also receive six to eight pounds per hundred square yards of potassium sulfate.

"The Effect of Superphosphate in Cyanamid-Treated Plant Beds in Preventing Ammonia Toxicity," by William A. Seay. *Tobacco*, Vol. 145, No. 5, pages 22 to 24. Aug. 2, 1957.

LITERATURE AVAILABLE

The following list reviews a series of bulletins on fertilizer, insecticide, and fungicide recommendations, controls, etc. These bulletins and reports are prepared by agricultural experiment stations, and copies may be obtained by writing directly to the respective stations.

CONTROL OF LICE AND MITES ON CHICKENS by P. E. Morrison and R. P. Thompson. An illustrated booklet covering serious pests of chickens in Canada. Control tables are included for both lice and mites. Publication 1012, May, 1957. Canada Department of Agriculture, Ottawa.

•

APPLE MAGGOT CONTROL STUDIES by Philip Garman. A report on the results of studies with new insecticides to overcome the increasing difficulties in the control of apple maggots in Connecticut orchards. Bulletin 604, March, 1957. The Connecticut Agricultural Experiment Station, New Haven.

•

THE ECONOMICS OF COTTON DEFOLIATION by Grady B. Crowe and Harry R. Carns. A study of the conditions which influence the net economic returns of cotton defoliation at individual locations. Bulletin 552, Mississippi State College, Agricultural Experiment Station, State College, Miss.

BOOK REVIEW SECTION

Grassland Seeds by W. A. Wheeler and D. D. Hill. Published by D. Van Nostrand Co., Inc., Princeton, N. J. 734 pages, price $12.50.

This book contains a mass of useful information about the grass and legume seeds used for forage, pasture, soil conservation, and other turf planting in the United States.

Part I is devoted to general topics such as testing, insect problems, disease problems, and the production, harvesting, processing, and marketing of seeds. Part II deals with specific grassland crops and their seed problems. Part III presents data and statistics on the more important seed crops.

More than 200 photographs and diagrams are included in this book which should prove valuable to the industries which service agriculture as well as to seed growers and dealers and professional workers in field seed production and distribution. The book is a part of the Grasland Farm series edited by Mr. Wheeler.

Treatise on Inorganic Chemistry, Volume II, by H. Remy. Translated by J. S. Anderson. Published by Eslevier Publishing Co., Amsterdam. 800 pages, price $17.75.

Volume I of this treatise dealt with the main groups of the periodic table,—the present volume II goes on to describe the elements of the subgroups and subjects related to them, and concludes with a few chapters on general topics.

Heinrich Remy is professor of Inorganic Chemistry at the University of Hamburg, Germany. J. S. Anderson is professor of Inorganic Chemistry at the University of Melbourne, Australia.

QUIZ

Kaolin in Mixed Fertilizers

Researchers at the Wisconsin Agricultural Experiment Station, Madison, Wis., have found that if a small amount of kaolin is added to mixed fertilizer it forms a thin film around fertilizer particles which resists caking.

The project is a followup on previous research which indicated that a small amount of fuel oil added to fertilizer would retard caking and dustiness. Neither oil nor kaolin affect crop yield, but kaolin will not reduce dustiness, the researchers, I. Ahmed and O. J. Attoe of the soil-science staff, say. Fuel oil could not be used in nitrate fertilizer because of the fire hazard but, since kaolin does not burn, it should be safe.

The Wisconsin station's report, released in October, tells how the investigators added various amounts of kaolin and/or fuel oil to a 5-20-20 fertilizer, then "caked" the mixture by putting it under 1,000 pounds pressure. The "crushing strength" of the cake was next tested in a machine which measured the amount of pressure required to break the cake apart.

Addition of 2 per cent kaolin was a little more effective than addition of two milliliters of fuel oil per 100 grams, the report states. Addition of 1½ per cent of kaolin plus one milliliter of fuel oil per 100 grams gave the greatest reduction in crushing strength. Further additions of either kaolin or oil did not reduce crushing strength much more.

•

Control Of Carrot Rust Fly

Two insecticides are recommended for the control of carrot rust fly (Psila rosae) by W. A. Rawlins and Emmett Harris Jr., Department of Entomology and Limnology, Cornell University, Ithaca. They recommend heptachlor and aldrin for all three methods of application—seed treatment, row application, and broadcast.

Parathion liquid concentrate can be used in the row application at the rate of one quart per acre but it is less effective than heptachlor and aldrin as a soil treatment and is not recommended.

QUIZ

For Multiwall Bag Buyers

"How Does Your Packaging Operation Rate?"

Perhaps we may be able to help you to arrive at the right answers in order to achieve higher production at lower costs.

KRAFT BAG CORPORATION

Gilman Paper Company Subsidiary

630 Fifth Avenue, New York 20, N. Y.
Daily News Bldg., Chicago 6, Ill.

Plants at St. Marys, Ga. and Gilman, Vt.

Sales Agents for The **Kraftpacker** Open Mouth Bag Filling Machine

Gilman PAPER CO.
- St. Marys Kraft Corp.
- Gummed Tape Div.
- The Gilmanized Corp.
- Kraft Bag Corp.

☐ O.K. Kraft...Help me to answer your Quiz. Please have representative call. AC

COMPANY_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

PRODUCT MFD_____

NAME_____

Dry dust insecticides cost less to produce– cover more uniformly

when formulated with

CELITE

diatomite fillers

When applying dry dust insecticides, it's the volume that counts. Yet when you buy inerts, you pay by the pound. That's why Celite saves you money because it gives you as much as 10 times more volume than equal weights of other mineral fillers.

Another important Celite benefit is the neutralizing of dense let-down agents. These usually pack down and form pockets of inactive ingredients. But when a small percentage of Celite is present its high bulking action keeps the final dust fluffed up, assuring uniform poison dispersion on any foliage.

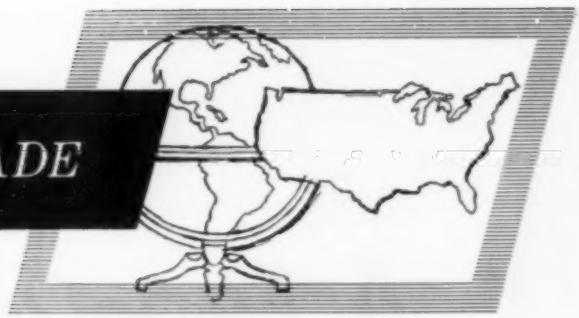
Ask your Celite engineer to demonstrate these advantages in your plant. Call him at your nearest J-M sales office or write Johns-Manville, Box 14, N.Y. 16, N.Y. In Canada, Port Credit, Ontario.

*Celite is Johns-Manville's registered trade mark for its diatomaceous silica products

Johns-Manville CELITE

INDUSTRY'S MOST VERSATILE MINERAL FILLER

NEWS about the TRADE



Ferris Heads Bonneville

Lockwood W. Ferris has been named president and general manager of Bonneville Ltd., Salt Lake City, Utah. He was formerly vice president and general manager.

Mr. Ferris succeeds William L. Bradley who was named chairman of the board, a newly created position with the firm.

•

Shell to Build in Canada

The Shell Oil Co. of Canada, Ltd. has announced plans for construction of an agricultural chemical plant at Simcoe, Ontario.

The plant will formulate granular and regular insecticide dusts, wettable powders and seed dressings. It is scheduled for completion early this year.

•

Changes at Olin Mathieson

Dr. Alfred Weed has recently been named promotion manager for household insecticides for the Insecticide Division of Olin Mathieson Chemical Corporation. His headquarters will be located in Asheville, N. C. C. M. Norton has been named assistant manager of the Insecticide Products Department, assisting G. D. Baerman, manager, who recently succeeded R. J. Zipse in this position. D. M. Malcolm has been advanced to manager of customer service and Paul Williams will be manager of insecticide sales for the Midwest territory.

Plans of the division for 1958 include a program to introduce "Terraclor" to farmers through local distributors. A series of meetings will be held with growers and distributors in various parts of the country at which use of the product on crops grown in the various areas will be discussed.

•

Whinfrey Joins Great Lakes

Charles G. Whinfrey Jr. has been appointed manager of sales for Great Lakes Solvents, Inc., Chicago. Mr. Whinfrey was formerly manager of Northern Agricultural Chemical operations for Pennsalt Chemicals Corporation.

Mr. Whinfrey will direct the sales for Great Lakes' full line of chemicals, aromatics and naphthas. He will also manage the company's agricultural chemical compounding facilities.

•

Long, Illnick Join Chipman

The Chipman Chemical Co., Inc., Bound Brook, N. J., has announced the appointment of John C. Long as manufacturer's agent for its agricultural chemical line in Pennsylvania.

At the same time the company announced the appointment of Frank Illnick as agricultural sales and field representative in the Northeast.

Mr. Long was affiliated with the Tobacco By-Products & Chemical Corp. as district sales manager when that company became the Black Leaf Products Division of the Virginia-Carolina Chemical Co. in 1953. He continued as district sales manager when Diamond Alkai purchased the Black Leaf Products Division in 1955. Mr. Long retired from Diamond last year.

Mr. Illnick was formerly employed by Baugh & Sons Co., Philadelphia, as sales and plant manager of their Jamesburg, N. J., plant.

Monsanto Transfers Rotramel

J. G. Rotramel, farm chemicals representative for the Monsanto Chemical Co.'s Organic Chemicals Division, has been transferred to Columbus, Ohio, in a doubling of the company's sales service on farm chemicals in the six-state area of Illinois, Indiana, Kentucky, Michigan, Ohio, and Wisconsin.

The area formerly was part of a larger sales territory serviced by E. M. Billings.

In addition to added sales coverage, the area will be given increased technical service on Monsanto farm chemicals by Herbert J. Ploch, a technical sales specialist on agricultural chemicals.

•

AP&CC Opens Chicago Office

The American Potash & Chemical Corp., Los Angeles, has opened a Great Lakes Midwest territorial office in Chicago to service an area bounded roughly by North Dakota to Kansas on the west, Oklahoma to Arkansas on the south, and Kentucky to Michigan on the east.

Edward C. O'Connor and Wallace O'Dowd have been named sales representatives for the new office and John L. Anderson has been appointed manager.

•

IFCS Modernizes Plant

Illinois Farm Supply Co., an agricultural cooperative with headquarters in Chicago, has modernized its St. Louis fertilizer plant by installation of commercial production facilities for manufacture of granular high analysis fertilizer materials by the Seymour process. This process successfully

A REPORT FOR YOU ABOUT Hi-D® AMMONIUM NITRATE

DEALERS PREFER Hi-D

"The rapid acceptance and demand for Hi-D was amazing."

"Hi-D is a better product in good bags."

"Arrived in better shape and stored better for a longer period."

"First time farmers have ever specified a brand of ammonium nitrate."

"Hi-D bags stand out well in warehouse. Farmer notices them as soon as he walks in."

"We've had really good reports about the product from our Hi-D customers."

"When farmers asked for ammonium nitrate, we sent them Hi-D. We were surprised at the number who insisted on Hi-D when they re-ordered."

"The spring advertising campaign sure built farmer recognition for Hi-D."

FARMERS PREFER Hi-D

"Really prefer the Hi-D granules in our field machinery over other kinds of ammonium nitrate."

"The men all like the way Hi-D handles. Hi-D throws nicely. What we don't use at once stores very well."

"Best moisture-proof bag I've ever seen. Used Hi-D on coastal Bermuda grass and corn, plus oats and rye in winter. A really free-flowing material, you never get too much or too little. Hi-D is always in good condition even after storing."

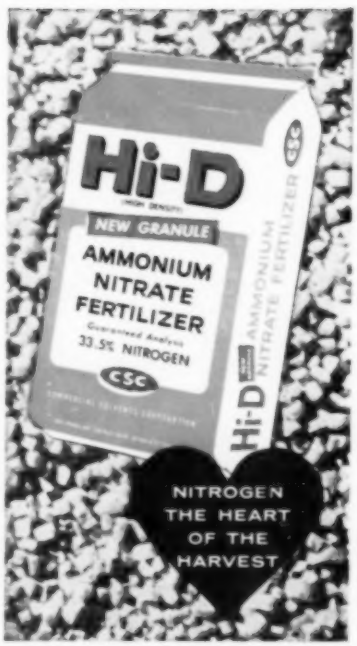
PILOTS PREFER Hi-D

"Hi-D arrives dry and stays dry. Flows evenly from start to finish. Plane hopper holds up to 25% more material. Saves me air time."

"More pounds of Hi-D in the hopper saves air time. Really flows nice. Fly at 30 feet with prills, 36 feet with Hi-D which means fewer times through a field, more profit per job."

"Hi-D is always dry when we open it. Flows regularly from start to finish – no bridging in the hopper. Shuts off fast. No bind due to dust."

IT'S EASY TO SEE THAT IT'S EASIER TO SELL Hi-D!



A PRODUCT OF **COMMERCIAL SOLVENTS CORPORATION** 1817 WEST FULLERTON AVENUE, CHICAGO 14, ILL.
STERLINGTON, LA. • 344 WILLIAMS ST., N.W., ATLANTA, GA. • 7890 FOLK AVE., ST. LOUIS, MO. • TERRE HAUTE, IND.

hydrolizes calcium metaphospate. At the co-op's annual meeting, G. H. Becker, general manager, announced that the process has been perfected to the point where commercial application seems practical. Illinois Farm Supply, Mr. Becker also reported, has done considerable modernizing at its Tuscola, Ill., fertilizer plant, with substantial improvement of products made there.

•

Head Cotton Insect Research

The Entomology Research Division, Agricultural Research Service, USDA, has announced the appointments of C. F. Rainwater and Dial F. Martin to direct its cotton insect research. The former Cotton Insects Section, which was headed by K. P. Ewing who retired on August 31, is now divided into two sections, the Pink Bollworm Section, headed by Dr. Martin with headquarters at Brownsville, Texas, and the Cotton Insects Section headed by Mr. Rainwater with headquarters at Beltsville, Maryland.

Mr. Rainwater began his career in cotton insect research at Tallulah, Louisiana, in 1928. He was appointed a full-time entomologist in 1931 and has remained in cotton insect research ever since.

Since 1952 Dr. Martin has headed a broad research program on cotton insects, with particular emphasis on pink bollworm research, for the Texas Agricultural Experiment Station.

•

New Mylone Formulation

The Union Carbide Chemicals Company, Division of Union Carbide Corp., New York, has developed a new way to formulate Mylone soil fumigant, and will institute a new plan for marketing the product.

The new formulation—to be designated Crag Mylone 50D Soil Fumigant—is a free-flowing mixture containing dry wheat bran. It can be applied with a fertilizer spreader, and effective control of soil fungi, nematodes, insects, and weed seeds can be obtained without the use of a plastic cover, according to the company.

NPFI Northwest Representative

F. Todd Tremblay has been named Pacific Northwest representative of the National Plant Food Institute, for the states of Idaho, Montana, Oregon, and Washington, with headquarters in Seattle.

Mr. Tremblay will have specific responsibilities for conducting the Institute's expanded program of research and education in the Pacific Northwest.

For the past five years, he has been manager of the Fertilizer and Farm Chemicals Department of the Washington Co-Operative Farmers Association, during which time he helped initiate the production of field corn on a commercial basis in the irrigated areas of eastern Washington.

•

Bush Named Merck Chairman

Dr. Vannevar Bush has been elected chairman of Merck & Co., Inc., Rahway, N. J. Dr. Bush has been a director of Merck since 1949 and also is a member of the executive committee. He succeeds the late George W. Merck.

At the same time George W. Perkins was elected a director of the company. Mr. Perkins rejoins the Merck board after an absence of nine years during which he was with the Federal Government, most recently as United States representative on the North Atlantic Treaty Organization Council with the rank of Ambassador.

•

Crabgrass Control In Kansas

Exceptional results with control of crabgrass on test plots at Kansas State College, Manhattan, Kans., have been reported by Ronald Campbell of the K-State Agricultural Experiment Station.

Four di-sodium methyl-arsonate formulations gave almost perfect control of crabgrass when used as post-emergents and gave perfect control for mature crabgrass seedlings when used as a liquid spray. The materials also gave good control with mature plants when used as a dry powder.

Two phenyl mercuric acetate herbicides gave fairly good control as post-emergents and with mature plants. The other chemical tested, chlordane, did not work either as a post-emergent or with mature plants.

All pre-emergents used by Mr. Campbell materially reduced stands of crabgrass. These were applied at four week intervals. Of 16 different materials, the outstanding results were achieved with chlordane, PAX, and lead arsenate.

•

Northeast Weed Conference

The 12th annual meeting of the Northeastern Weed Control Control Conference, to be held in the Hotel New Yorker, New York, Jan. 8 to 10, will feature a discussion of promising new materials for weed control by E. M. Rahn, University of Delaware, Newark, and a talk on Simazin as a soil sterilant by E. O. Snyder, Geigy Agricultural Chemicals, Napersville, Ill.

A comparison of granular and liquid carriers for herbicides will be presented in a paper prepared by R. D. Sweet, G. D. Crabtree, and D. B. Bakes, Cornell University, Ithaca, N. Y. P. L. Poulos, E.I. du-Pont de Nemours & Co., Wilmington, Del., will discuss Neburon: Newest Commercial Member of the Substituted Urea Family.

F. S. Kirkpatrick, Western Soil Management, Newark, N. J. will talk about the custom applicator in the field of industrial weed control. A comparison of granular and liquid applications of herbicides in gladiolus will be given by E. C. Gasiorkiewicz, University of Massachusetts, Waltham Field Station, Waltham.

Sessions at the meeting will be divided into sections covering; horticultural crops, agronomic crops, forestry and industrial weed problems, public health, and aquatics.

•

NPFI Grant to Oregon State

A $2,100 research grant has been made available by the National Plant Food Institute to Oregon State College, Corvallis, for the purpose of conducting an economic study of fertilizer use.

The one-year grant will provide an assistantship, under the supervision of Dr. W. G. Brown, assistant professor in agricultural economics, and the study will be made in the college's Agricultural Economics Department.

Announcing St. Regis' New

SUPER STEPPED-END

...3 big steps ahead of other stepped-end bags!

1. 3 TIMES MORE PROTECTION AGAINST SIFTING!

With exclusive new Staggered Flap construction, end flaps of the bag overlap not just once, but three different times to seal bag ends completely! Result: St. Regis Super Stepped-End Bags give you 3 different guards against siftage . . . 3 times more effective protection against product loss . . . *cleaner* bags!

2. FASTER, EASIER FILLING . . . CLEANER BAGS!

Note the new Full Insert on St. Regis Super Stepped-End Bags. This feature, tested over and over again in St. Regis laboratories and in the field, effectively reduces blow-back and siftage at the valve. And, improved pasting makes it easier to place the bag on the filling tube . . . helps step up your production!

3. ALL-PLY PROTECTION IN ALL CORNERS!

No inner ply cut-out corners to weaken the bag! With new Staggered Flaps, St. Regis is first to give you extra protection against siftage plus maximum strength in all four corners. Most important of all, St. Regis Super Stepped-End Bags give you the advantage of complete product protection. Since corners are not cut out, only the sheet designed for the job touches the product!

Stepped-End Bags were invented and developed by St. Regis. To date, more than 200 million have been bought by industries looking for better packaging. For a full demonstration of this important new development—the Super Stepped-End Bag—call your St. Regis representative today!

MULTIWALL PACKAGING DIVISION

St.Regis PAPER COMPANY

150 EAST 42ND STREET, NEW YORK 17, N.Y.

PULP PAPER PACKAGING PLASTICS

Tenth California Weed Conf.

The tenth annual California Weed Conference, being held at the St. Clair Hotel, San Jose, Jan. 21 to 23, will have as its theme, Progress and Promise in Ten Years.

Among the scheduled speakers are C. E. Otis, Dow Chemical Co., Midland, Mich., who will speak on industry progress since 1949; J. Dreessen of the National Agricultural Chemicals Association, who will speak about roadside brush and weed control on a national basis; and W. C. Jacobson, California Director of Agriculture, Sacramento, who will tell what to look for in weed control legislation.

L. G. Jones, Agronomy Department, University of California, Davis, will discuss the future of weed control in forage crops and a panel of speakers from industry will discuss "What Is New in Weed Control?" A panel on plant injury will include T. C. Fuller, State Department of Agriculture; L. M. Smith, University of California, Davis; D. G. Aldrich, U. of California, Davis; and J. T. Middleton and B. Day, Citrus Experiment Station, U. of California, Riverside.

•

Pest Control Exhibition

A Crop Protection and Pest Control Exhibition has been scheduled to be held at the Royal Horticultural Society's New Hall in London England, May 12 to 15.

The exhibition will be concerned largely with weed control and pest control in agriculture and horticulture, but it will also deal with domestic and industrial pests, according to an advance announcement.

•

CFA Fertilizer Conference

The sixth annual California Fertilizer Conference will be held April 13 to 15 on the campus of California State Polytechnic College, San Luis Obispo.

The conference is sponsored by the Soil Improvement Committee of the California Fertilizer Association. The program, which will be general in coverage, is expected to lean somewhat toward range fertilization.

C&I Plant Model An authentically piped ¼" scale model of the Sohio nitric acid and ammonium nitrate solutions plant was among the exhibits at the Chemical Show in New York the week of December 2nd. At right are A. M. Taylor, R. McConnell, T. Long and B. Burke of Chemical and Industrial Corp., Cincinnati.

DDT Spray Trial Date Set

Judge Matthew T. Abruzzo of the United States District Court in Brooklyn, N.Y., has scheduled for the first week in February the DDT trial stemming from last spring's aerial spray program to control the gypsy moth in New York, New Jersey, and Pennsylvania.

The plaintiffs are a group of Long Island residents who contend that the spraying was a constitutional violation and a health hazard and who are seeking to enjoin the Federal Government from again spraying Nassau and Suffolk Counties with DDT.

Assistant United States Attorney Lloyd Baker opposed the property owners' petition to get an early trial. He said the Government had no plans to spray DDT over the two Long Island counties next summer.

•

Montrose Ups DDT Price

The Montrose Chemical Co. of California has advanced the price of technical grade DDT two cents per pound. Its new carlot prices for DDT are 21 cents per pound for chips or flake, and 22 cents per pound for powdered material, f.o.b., plant, freight allowed to all Continental U.S. points packed in multiwall paper bags.

•

New Growth Control Agent

The Insecticide Division of Olin Mathieson Chemical Corporation has recently made the first experimental sale of beta hydroxyl ethyl hydrazine for controlling the flowering of pineapples. This new product controls maturing of the crop so that it may be harvested and marketed at the time most advantageous for the grower.

•

Frank Nelson Retires

Franklin C. Nelson retired January 1 as senior technologist for Esso Standard Oil Company, Linden, N.J. Mr. Nelson had been with Standard Oil for 31 years and was in charge of the aerosol and specialty laboratory for the company. He had been associated a number of years ago in much of the early development work on "Flit."

•

To Represent Century

The A. A. Klughartt Machinery Co., Kansas City, Mo., will represent the Century Engineering Corp., Cedar Rapids, Iowa, in Kansas and western Missouri by offering the Century line of sprayers, seeders, granular insecticide applicators, farm utility heaters, and accessory items.

•

Carbide Marketing Head

John A. Field has been named to fill the newly created position of Vice-President — Marketing, Union Carbide Chemicals Company, division of Union Carbide Corp., New York.

In this position, Mr. Field will be in charge of all Carbide's chemical marketing functions, now being consolidated in an integrated company marketing organization. A vice-president since December, 1954, Mr. Field previously had been responsible for sales development and allied activities.

Arcadian® News

Volume 3 | For Manufacturers of Mixed Fertilizers | Number 1

EFFICIENT OPERATION PAYS IN MIXING GRANULAR GOODS

Methods for Safeguarding Profits and Plant Safety

Careful cost accounting is a money-saving practice in any business. By the same token, it will pay you to keep a constant and efficient check on the methods and materials you utilize in manufacturing granular fertilizers and high-analysis mixed goods. Such a practice not only saves money, it also serves as a safeguard in maintaining a good safety record in the mixing operation.

Avoid Waste to Save Money

Maintaining top efficiency in the mixing operation for making high-analysis fertilizers keeps costs down by avoiding waste of acid and nitrogen. At the same time it greatly reduces danger of fires, hot spots and other hazards.

Even without acid, a big tonnage of high-analysis fertilizer is being manufactured by using the correct nitrogen solution to get a high ammoniation rate for superphosphate through proper mixing. Addition of sulphuric or other acid is often required to obtain desired fertilizer condition. The acid neutralizes ammonia and holds more nitrogen for high analysis. It also produces the high temperature and low water content required for proper granulation.

With the use of acid, any inefficiency in mixing immediately becomes expensive and hazardous. Either with a batch mixer or a continuous ammoniator, skillful operation is needed to do a good, low-cost job of mixing acid, solutions and dry materials. The spray pipes for acid, solutions, and water if needed, should be separate and in good condition. The rotating flights in the mixer must be kept clean. And the timing of the entry of all materials must be correct. Such a mixing operation can produce fertilizer with very little waste of acid or nitrogen, and with hardly any fumes and no hot spots.

Inspect Spray Pipes Daily

Perhaps the biggest drawback in otherwise excellent equipment is the difficulty involved in changing spray pipes. Careful checking and replacement of the spray pipe that introduces nitrogen solution into the mixer always pays well. Even more careful checking is needed for the spray pipe that introduces acid into the mixer. Daily inspection is best. Some acid pipes have been known to last only 3 or 4 days before losing their good acid distribution pattern. When the meters show an excessive use of acid, the spray pipes should always be examined.

The most modern continuous ammoniator is no guarantee of low acid and nitrogen costs if it is not skillfully operated. Likewise, an old batch mixer, if carefully operated, can do a good job of producing high-analysis goods.

Ask Nitrogen Division

To keep costs down, and to prevent hot spots or fires in the mixer, the main essentials are good operating skill, spray pipes with a good distribution pattern, and proper amounts of acid and the right ammoniating solution. In some mixing operations, skillful handling of the right high-ammonia solution can produce good quality and condition without using acid.

With the wide variety of equipment, plant food ratios, and analyses in common use today, many different ammoniating solutions are required for efficient and economical mixing. Nitrogen Division has the broadest line of nitrogen solutions and experienced technical people to help you get the best results possible with your equpiment and production program. Ask the Nitrogen Division technical service man to help you pick the right solutions for your operation. His services are available to customers at no cost. For prompt technical help, write Nitrogen Division, Allied Chemical, 40 Rector Street, New York 6, N. Y. Telephone: Hanover 2-7300.

Arcadian News for Fertilizer Manufacturers . . . . . from NITROGEN DIVISION

Boom in Irrigation Opens a Big Fertilizer Market

TONNAGE OPPORTUNITIES

Severe drouths of the past several years have made farmers everywhere take to watering crops. And there's no better place for a fertilizer salesman than a new irrigation area. With the biggest yield-limiting factor, shortage of water, taken care of, the next big limiting factor shows up strong. That is lack of enough fertilizer. Put water and fertilizer together and yields shoot up.

Water alone doesn't make a succession of big crops. The situation with water and fertilizer is like the old riddle about the hen and the egg. It is not really important which came first, but it is mighty important that you have both.

Too many farmers waste irrigation water by not feeding their crops enough fertilizer to take advantage of the new water supply. The first year a farmer irrigates, he may get a big increase in crop yields due to the plant food reserves in the soil. Then his yield drops off, unless he goes to see his fertilizer dealer, or his dealer comes to see him.

In Nebraska, for example, many corn growers are getting only 60- and 70-bushel yields with irrigation. Yet these same fields with enough fertilizer are producing 125-bushel yields with plenty of water. The 1956 winner in the state corn contest produced 208 bushels of corn per acre by using enough water and plant food.

One Iowa farmer lost his unfertilized 1952 corn crop because of drouth. In dry 1953, 4 inches of sprinkler irrigation gave him 65-bushel corn, while his dryland corn produced 30 to 35 bushels. Then, in 1954, sure of a water supply from the nearby river, he used 8 inches of water plus fertilizer. One corner of the field that was missed by the sprinkler didn't produce an ear. But the rest of the field averaged 90 bushels per acre. Even in years of normal rainfall, he had never before gotten more than 70 bushels of corn per acre.

The story of teamwork between fertilizer and water is the same everywhere. In Alabama, irrigation alone failed to improve the yield of Dallis grass pasture. But 600 pounds of fertilizer per acre, plus irrigation, increased the yield 3 tons per acre dry weight. Unirrigated cotton yielded only 1,900 pounds of seed cotton per acre. Water and 240 pounds of nitrogen increased the yield to 5,000 pounds of seed cotton per acre.

Irrigated plots, with and without fertilizer, are excellent sales builders for fertilizer, the sure way to show that crops need more fertilizer when they get more water. By picking a soil that is not loaded with plant food at the start, you can dramatize the need for fertilizer.

Balance is Important

Balance between water and fertilizer is just as important as balance between nitrogen, phosphorus and potash. Many farmers learn this only by seeing disappointing yields from their first or second try at irrigation. Whether the water comes from irrigation or from extra good rains or deep soil moisture, the result is the same. No crop can produce much extra growth from water if it lacks soil fertility. This is shown by Missouri corn fertilization tests in a year with only 5 inches of rain during the growing season. Deep subsoil moisture was good. Unfertilized corn produced only 18 bushels per acre and extracted moisture from a 2-foot depth of soil. This crop used 21,000 gallons of water per bushel harvested. Corn with adequate fertilizer drew moisture from a 5-foot depth of soil and produced 79 bushels per acre. With enough plant food to make use of moisture, this corn used only 5,600 gallons of water per bushel.

Likewise, 3 years of tests in New York State showed that "high-fertilization" hay and pasture consistently outyielded irrigated plots with "normal-fertilization." A 5-year Illinois test of pasture irrigation without fertilizer showed that the small increase in beef production did not pay for the irrigation.

Irrigation is on the increase everywhere that farmers can build ponds, dig wells or pump from streams. For high-value, intensive crops that are always highly fertilized, irrigation almost always pays well, even in short dry spells. For field crops and pastures, water provides profits in proportion to the fertilizer used.

How big is the irrigation market? In the West, where irrigation first grew big, there has been about a 10% increase in watered acreage since 1954. Water supplies have been the biggest limiting factor. Nebraska alone has 2 million irrigated acres today.

In the humid East, irrigation was so unimportant until recently that no census data were kept for the 28 Eastern states. But the long-time weather records show that even in most of this area, which has 30 inches or more rainfall in normal years, drouth periods are long enough most years to make supplemental irrigation produce profitable yield increases. Farmers are finding this out. In 1939, the 28 Eastern states had about 39,000 irrigated acres. By 1954, this had increased to 546,000 acres. The latest figures show 650,000 acres are irrigated in the East. Everywhere that water is put to work in irrigation, it is building new fertilizer markets. It will pay you to follow the water to the fields!

Promote Better Pastures to Sell More Fertilizer

Pastures and meadows are the stepchildren in the farm crop family, when it comes to fertilizer use. Our starved and sod-bound grasslands should be a big market for fertilizer. We have 984 million acres of hay and pasture land, compared to 335 million acres in tilled crops. How do we spread the word that it pays to spread fertilizer on grass?

When a farmer fertilizes corn or wheat, he sees the results in more bushels at harvest. When he tries a little fertilizer on pasture, the results are hard to see. Cows graze away the evidence. And he cannot easily measure the extra milk or meat produced.

Grass is a lot of different crops that require different kinds of management. Orchard grass has to be handled differently than blue-grass or timothy. Reed canary grass is nothing like fescue or wheat-grass. Coastal Bermuda grass is quite another thing than common Bermuda grass. Farmers say grass crowds out legumes, but legumes sometimes appear to crowd out brome grass. The wrong timing of grazing and harvesting often diminishes the benefits that fertilizer provides.

How is it then, that some farmers use 500, 1000 pounds or more fertilizer per acre to make grasslands pay well? Several basic principles help them make money on grass. They use new seeding methods to establish good stands. They use deep-rooted grassland crops that make good use of more fertilizer. They manage their grasslands for a longer producing season. They aim to have animals per acre instead of acres per animal. On arid rangeland, this won't work. But anywhere grass gets enough water to produce one ton of feed per acre under ordinary management, fertilizer can produce extra tons of profit-building feed. The fertilizer dealer can profit by dramatizing the large yields produced with plenty of fertilizer.

It is important, when grass is liberally fertilized, to cut or feed it while young. There is greater feed value in young grass—more protein, more vitamins, more palatability. And the next cutting comes along sooner. A 1,000-pound dairy cow will eat 105 pounds of lush pasture per day, while she will eat only 80 pounds of average fertilized pasture or 60 pounds of poor pasture. A cow will eat 2½ pounds of young-cut hay for every 1½ pounds of poor, late-cut hay she will chew down.

Continuous Grazing

Good farmers grow several different pasture crops to get a sequence of grazing over the growing season. Top-dressing with fertilizer several times a year also helps produce a long pasture season.

Where legumes do not thrive, grass can make big yields of feed rich in protein. Fall application of mixed fertilizer plus heavy nitrogen top-dressing in late spring makes amazingly big hay crops. And the crude protein content of such hay may go up to 16 or 20%. One New Jersey test produced one ton of protein per acre in grass hay. The late spring application of high-nitrogen fertilizer, just a few weeks before harvest, moves directly into building high protein content in the first cutting of hay. Such a program has produced 4 tons of 20% protein hay per acre.

New varieties of deeper-rooted grasses are capable of using high rates of fertilizer to push out really big yields of low-cost forage. In the South, for example, Coastal Bermuda grass is producing 10 to 12 tons of dry-weight forage per acre. Florida results with Bahia and Pangola grass show 20 extra pounds of dry forage produced for every extra pound of nitrogen in fertilizer.

Georgia and Texas report 700 pounds of beef per acre of high-yielding, well-fertilized grass.

Farther north, fescues, orchard grass, brome, Reed canary grass and other vigorous varieties are well able to use large amounts of fertilizer to produce big yields of forage. Farmers often complain about sod-bound grass that produces little feed. Small amounts of fertilizer make little improvement. But heavy applications of fertilizer make yields jump.

In North Dakota and Minnesota, for example, sod-bound brome and crested wheat grass were producing only one ton of hay per acre. Fertilizer application, including 30 pounds of nitrogen, boosted yields to 2½ and 3½ tons per acre. In Missouri, rough, hilly, erosion-prone land seeded to fertilized grass and legumes is producing as much feed as good bottom land.

How do you measure hay and pasture profits from fertilizer? Bales of hay per acre are easy to measure. Pasture cow days per acre, beef and milk gains per week, extra days or weeks of grazing take effort to measure. They are seen best by the farmer who likes to keep records. And there are reams of records of pasture profits made with fertilizer.

It will pay you to obtain all available information applicable to your sales territory and use it to aggressively spread the word that proper management and plenty of fertilizer make pastures highly profitable. Pastures are a big tonnage opportunity for fertilizers.

HERE'S THE BIG LINE OF Arcadian® NITROGEN SOLUTIONS

When you purchase your nitrogen requirements from Nitrogen Division, Allied Chemical, you have many different nitrogen solutions from which to select those best suited to your ammoniation methods and equipment. You are served by America's leading producer of the most complete line of nitrogen products on the market. You get technical assistance and formulation advice from the largest and most efficient staff of nitrogen experts. You benefit from millions of tons of nitrogen experience and the enterprising research that originated and developed nitrogen solutions.

	CHEMICAL COMPOSITION %						PHYSICAL PROPERTIES		
	Total Nitrogen	Anhydrous Ammonia	Ammonium Nitrate	Urea	Water	Neutralizing Ammonia Per Unit of Total N (lbs.)	Approx. Sp. Grav. at 60°F	Approx. Vap. Press. at 104°F per Sq. In. Gauge	Approx. Temp. at Which Salt Begins to Crystallize °F
NITRANA®									
2	41.0	22.2	65.0	—	12.8	10.8	1.137	10	21
2M	44.0	23.8	69.8	—	6.4	10.8	1.147	18	26
3	41.0	26.3	55.5	—	18.2	12.8	1.079	17	-25
3M	44.0	28.0	60.0	—	12.0	12.7	1.083	25	-36
3MC	47.0	29.7	64.5	—	5.8	12.6	1.089	34	-30
4	37.0	16.6	66.8	—	16.6	8.9	1.188	1	56
4M	41.0	19.0	72.5	—	8.5	9.2	1.194	7	61
6	49.0	34.0	60.0	—	6.0	13.9	1.052	48	-52
7	45.0	25.3	69.2	—	5.5	11.2	1.134	22	1
URANA®									
10	44.4	24.5	56.0	10.0	9.5	11.0	1.108	22	-15
11	41.0	19.0	58.0	11.0	12.0	9.2	1.162	10	7
12	44.4	26.0	50.0	12.0	12.0	11.7	1.081	25	- 7
13	49.0	33.0	45.1	13.0	8.9	13.5	1.033	51	-17
15	44.0	28.0	40.0	15.0	17.0	12.7	1.052	29	1
U-A-S®									
A	45.4	36.8	—	32.5	30.7	16.2	0.925	57	16
B	45.3	30.6	—	43.1	26.3	13.5	0.972	48	46
Anhydrous Ammonia	82.2	99.9	—	—	—	24.3	0.618	211	—

Other ARCADIAN® Nitrogen Products: UREA 45 • A-N-L® Nitrogen Fertilizer Ammonium Nitrate • American Nitrate of Soda • Sulphate of Ammonia

NITROGEN DIVISION Allied Chemical & Dye Corporation

MAIN OFFICE: 40 RECTOR STREET, NEW YORK 6, N. Y., PHONE HANOVER 2-7300

Hopewell, Va., P. O. Drawer 131 ..... Cedar 9-6301
Ironton, Ohio, P. O. Box 98 ..... Ironton 8-4366
Omaha 7, Neb., P. O. Box 166 ..... Bellevue 1464
Raleigh, N. C., 16 W. Martin St. ..... Temple 3-2801
Columbia 1, S. C., 1203 Gervais St. ..... Columbia 3-6676
Atlanta 3, Ga., 127 Peachtree St., N. E. ..... Jackson 2-7805
Memphis 9, Tenn., 1929-B South 3rd St. ..... Whitehall 8-2692
Columbia, Mo., P. O. Box 188 ..... Gibson 2-4040
Indianapolis 20, Ind., 6060 College Ave. ..... Clifford 5-5443
Kalamazoo, Mich., P. O. Box 869 ..... Kalamazoo 5-8676
St. Paul 4, Minn., 45 N. Snelling Ave. ..... Midway 5-2864
San Francisco 4, Cal., 235 Montgomery St. ..... Yukon 2-6840

Roberts Offering Amobam

Roberts Chemicals, Inc., Nitro, W. Va., is offering diammonium ethylene bisdithiocarbamate under the brand name "Amobam" for control of rust mite on citrus and for aid in the control of melon worm and pickle worm on squash and pumpkins.

Amobam is used by mixing with zinc sulfate to form Zineb in the spray tank. The high concentration of Amobam is said to make it the most economical route to Zineb.

The insecticidal uses listed by Roberts are in addition to the use as a soil fungicide for which Amobam has been offered. These uses include the control of seedling disease complex on cotton and damping off on vegetables.

•

Area Sales Supervisor

Elmo Jenson has been named area sales supervisor, southern Arizona, for the Plant Food division, Olin Mathieson Chemical Corp., New York.

Mr. Jenson will supervise sales of fertilizers and other agricultural chemicals in Arizona's Pinal, Pima, and Santa Cruz Counties.

•

Standard Chemical Co. Sold

The Standard Chemical Co., Troy, Ala., was sold at auction last month to two major stockholders for $124,750.

When operated at full strength, the plant had employed as many as 300 workers and produced 20,000 tons of fertilizer annually.

Mr. and Mrs. Louis Head of Troy purchased the plant which was valued at about $2,500,000, but said, "We will have to think about it before we know what we will do in the future." The plant closed last April.

•

Suffolk County Conventions

The 23rd Suffolk County Vegetable Growers' Convention at Riverhead, Long Island, N. Y., Jan. 15 and 16, will feature talks on insecticides, fungicides, and herbicides as they pertain to vegetable crops.

Dr. Maurie Semel, L.I. Vegetable Research Farm, will discuss better insecticides for cauliflower, cabbage and sprouts. Dr. Arden F. Sherf, Department of Plant Pathology, Cornell, will speak on new developments in vegetable disease control; and Dr. Stewart Dallyn, L.I. Vegetable Research Farm, will discuss chemical weed sprays for L.I. vegetables.

The Long Island Potato Growers Convention will be held Jan. 28 and 29, also at Riverhead.

The tentative program lists discussions of potato insecticides and diseases among the talks to be presented.

•

US Potash Vice Presidents

The United States Potash Co. Division of the United States Borax and Chemical Corp., New York, has announced the appointments of John E. Fletcher as vice president and sales manager of the company and Earl H. Miller as vice president and resident manager in Carlsbad, N. Mex.

Dow Chelate Changes

A new chelating compound as well as new names for the entire chelate line have been announced by The Dow Chemical Company. The new product is Versenol Z, designed for curing zinc deficiency in avocado orchards or deciduous trees of the northwest.

Dow also announced price reductions on its Versene chelating agents effective January 1. Reductions on certain chelating agents are reported to be as much as 20 per cent.

New names applied to chelate products will retain the Versenol and Versene trademarks but will be simplified. Under the new nomenclature, Versenol Iron Chelate will be known as Versenol F, Versenol Iron Chelate on Vermiculite will be Versenol FA, Versene Iron Chelate will be Versene F and Versene Iron Chelate on Vermiculite will be known as Versene FA. All of the names will appear on a redesigned line of packages planned to give uniform appearance to the line.

26th Chemical Exposition

The 26th Exposition of the Chemical Industries was held in New York on Dec. 2 to 6 at the Coliseum and featured displays of equipment and materials by hundreds of exhibitors.

The Link-Belt Co. of Chicago participated in the exposition with fullscale equipment displays in action. Among Link-Belt's operating units were their Roto-Louvre Dryer, a Helicoid screw conveyor, a vibrating screen, and an oscillating conveyor. In addition, there were displays of belt conveyor idlers, rollers and silent chains, and related power transmission products.

The Richardson Scale Co., Clifton, N. J., exhibited their Select-O-Weight System for proportioning formulas according to pre-punched IBM cards.

Sprout-Waldron & Co., Muncy, Pa., displayed a model 501—G Pellet Ace that can be used for pelleting fertilizers. Pellets produced by the Sprout-Waldron mill can range from the very small to the very large—up to one inch cubes.

Research and pilot plant equipment for drying and calculating was exhibited by the C. O. Bartlett & Snow Co., Cleveland. The company offers individual units or entire systems engineered and synchronized to meet exact individual requirements.

Also among the many exhibitors were: the Bemis Bro. Bag Co., St. Louis; The Frank G. Hough Co., Libertyville, Ill.; Mine Safety Appliances Co., Pittsburgh; the Patterson-Kelly Co., East Stroudsburg, Pa.; and the Toledo Scale Co., Toledo, Ohio.

The California Pellet Mill Co., Crawfordsville, Ind., was represented as were the Exact-Weight Scale Co., Columbus, Ohio; The Thayer Scale Corp., Pembroke, Mass.; B-I-F industries Inc., Providence, R. I.; Dorr-Oliver Inc., Stamford, Conn.; The Fuller Co., Catasauqua, Pa., General American Transportation Corp., Chicago; Grinnell Co., Providence, R. I.; Hardinge Co., York, Pa.; the Raymond Division of Combustion Engineering, Inc., Chicago; the Sturtevant Mill Co., Boston; Spraying Systems Co., Bellwood, Ill.; and the West Virginia Pulp and Paper Co., New York.

To Make Diethyltoluamide

The Cowles Chemical Co., Cleveland, has announced plans to manufacture diethyltoluamide, a new insect repellent.

Tradenamed "Detamide," the new product will be manufactured at Cowles' Skaneateles Falls, N. Y. plant. The repellent will be produced with a minimum meta isomer content of 95 per cent. Later the company plans to offer a product of 85 per cent meta content, to be known as "Detamide 85".

•

Minnesota Short Course

Lee M. Day, a U.S. Department of Agriculture economist at the University of Minnesota, spoke at the university's Soils and Fertilizer Short Course Dec. 6, and said that fertilizer does the most good when a farmer uses it to remove the "bottlenecks" from the farm business.

He said that how fertilizer is used depends on the relative amounts of land, labor, and funds a farmer has available. For example, Mr. Day said, suppose a farmer has a big acreage and is short on labor. This means he needs to concentrate on livestock enterprises that require plenty of grain, particularly corn. In this case, he said, fertilizer is more important for corn than for any other single crop. If a farmer has plenty of help available but is short on land, a dairy setup is a better bet, Mr. Day continued. This makes it as important to fertilize hay land as it is to fertilize corn.

A. C. Caldwell, a soils scientist at the university, also spoke at the meeting and said that phosphorus fertilizer used as a starter for corn can do an even better job if there is some nitrogen added with it. He said that the reason is that ammonia nitrogen with the phosphate increases a corn plant's ability to take up phosphorus from fertilizer.

Program chairman was Curtis Overdahl, University extension soils specialist.

W. P. Martin, head of the University soils department, led off the program with a talk on "Why are soil fertility problems so complex?" George Stanford, Tennessee Valley Authority official from Sheffield, Ala., discussed "Impact of new fertilizer materials."

A report on fertilizers and soil compaction came from George Blake, soils scientist, and Charles Simkins, extension soils specialist, discussed "A potential fertilizer market—native pasture fertilization."

•

Using Gibberellin on Cotton

Many cotton growers will be using gibberellin on parts of their acreage in 1958 to check out reported advantages of Beltwide experiment station and industry research, according to Jim Merritt, Merck & Co., Inc. Among benefits cotton growers of the mid-south and western cotton growing areas can expect are: 1) Treating seeds for better stands of cotton resulting from increased and earlier emergence; 2) spraying for increased boll set; and higher yield or longer fiber.

Dr. Merritt advised that several varieties of cotton grown in these areas have responded favorably in research conducted this year. The ability of these varieties to maintain growth produces a larger plant capable of setting more bolls and longer fiber. Major cotton varieties on the eastern seaboard seem to respond similarly when weather is adverse. But under ideal growing conditions their determinate growth habit has limited their production of fiber and apparently cannot be stimulated by spraying with gibberellins.

Extensive research on gibberellin will be continuted by colleges, experiment stations, and industry. Dr. Merrit said that Merck is expanding its grant-in-aid program during 1958 along with research by its own scientists to increase the fund of knowledge in this field.

•

Overbeek Joins Michigan

Dr. Donald E. Overbeek has joined the research staff of the Michigan Chemical Corp., Saint Louis, Mich.

Dr. Overbeek formerly was with the Stauffer Chemical Co. at Chauncey, N. Y., as a research chemist.

N. B. Will Spray Budworm

Two and one-half million acres of New Brunswick timber stands will be sprayed in 1958 to help control the spruce budworm, according to premier Hugh John Flemming who said that the present budworm situation in the province is the most encouraging in six years of forest spraying.

During 1957 spray operations covered almost two times the number of acres over the planned 1958 campaign.

Next summer the lowest budworm population since the late 1940's is expected in most of northern N.B.

•

IM&CC Names Surgent

Basil M. Surgent has been named an agricultural sales representative in the potash division of the International Minerals & Chemical Corp., Chicago.

Mr. Surgent will cover New York, New Jersey, Pennsylvania, and Delaware. He succeeds Robert A. Heuerman, who will be the company's potash sales representative in Quebec providence, the New England states, Virginia, Baltimore, and New York City.

•

Join Woodward & Dickerson

E. V. Linson and L. MacLean have joined the staff of Woodward & Dickerson, Inc., Philadelphia. Both Mr. Linson and Mr. MacLean are well known in foreign and domestic trade, with a number of years experience handling feed stuffs, fertilizers and chemicals.

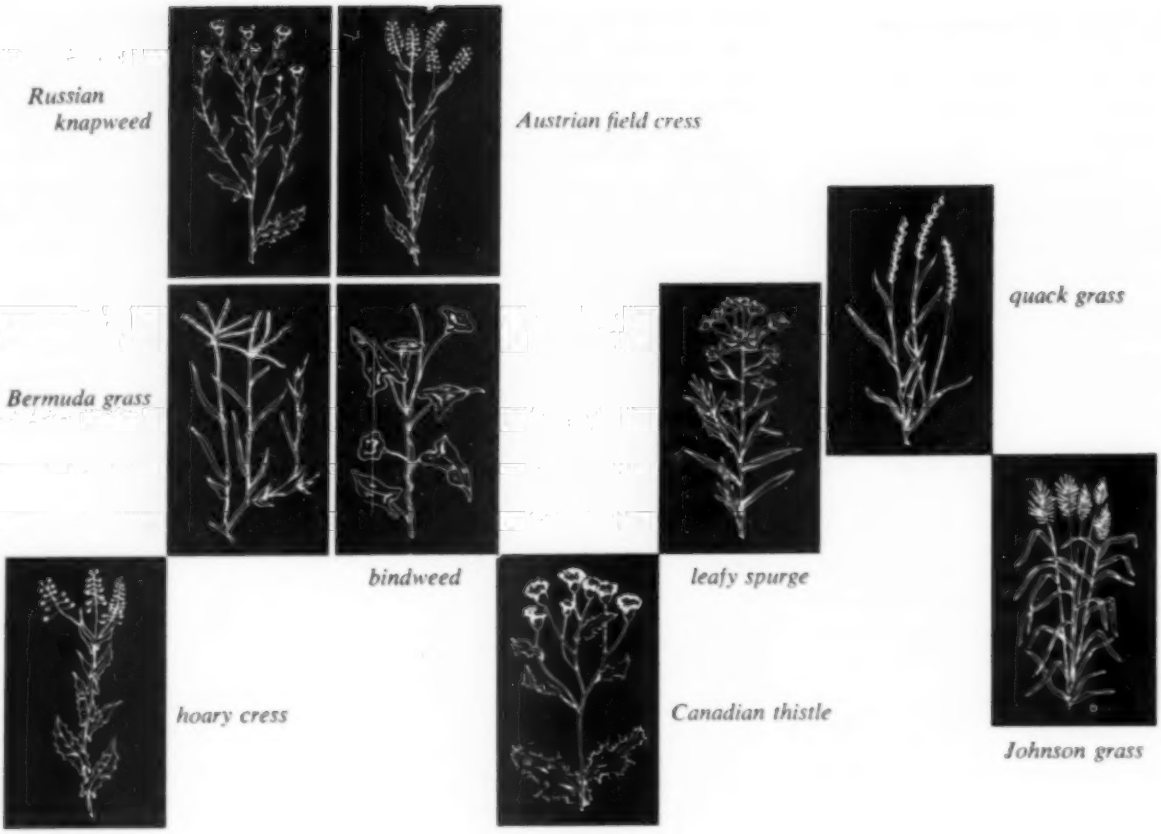
Woodward & Dickerson, Inc. are importers, exporters, brokers and commission merchants of feed and fertilizer materials, chemicals and mineral ores.

•

Purchases Black Leaf Plant

The Diversey Corp., Chicago, has purchased a five-building insecticide plant in Waco, Texas, from the Diamond Black Leaf Co.

The property includes two warehouses, an insecticide plant, employees' locker rooms, and an air-conditioned office building. Diversey will manufacture industrial cleansing products in the plant.



What's your **one** low-cost way to control them all?

You can control the weeds shown here, plus *all other weeds and grasses*, with OLDBURY® sodium chlorate, manufactured by Hooker.

It is effective on germinating weed seeds as well as growing roots. Its sterilant effects last up to one year in most sandy soils; and from one to two years in many heavier soils. It gives these results at *lower cost* than any other chemical.

You're in good company when you recommend OLDBURY sodium chlorate for broad-spectrum weed control. For years it has been first choice of many county agents in states where weed control is regulated by law.

Look for this trademark—it gives you these advantages...

OLDBURY® 1896

Acceptance: Farmers have come to know and trust the OLDBURY label wherever it has been introduced.

Dependable service: Fastest delivery you can get in East and South—direct from the nation's largest producer of sodium chlorate. Two plants—Niagara Falls, N. Y., and Columbus, Miss.—insure plenty of capacity to meet your needs in a hurry.

Technical help: You can use the services of full-time Hooker agronomists. They're equipped to help you plan weed control programs in your area; can advise you on handling, storage, and application of sodium chlorate.

You can get 99% pure OLDBURY sodium chlorate in steel drums, 100 and 350 lbs. net. For price and shipping information, write us today.

For controlling weeds on railroad right-of-way, you can get the skilled services of specialists who apply formulations made with OLDBURY sodium chlorate.

For defoliating cotton in irrigated areas, you can recommend special-purpose sprays made by formulators using OLDBURY chlorate.

If you'd like names and addresses of these specialist firms, write us.

HOOKER ELECTROCHEMICAL COMPANY
601 Buffalo Ave., Niagara Falls, N. Y.

HOOKER CHEMICALS PLASTICS

DUREZ® PLASTICS DIVISION • NORTH TONAWANDA, N. Y.
NIALK® CHEMICALS • NIAGARA FALLS, N. Y.
OLDBURY® CHEMICALS • NIAGARA FALLS, N. Y.

Sales Offices: Chicago, Ill.; Detroit, Mich.; Los Angeles, Calif.; New York, N. Y.; Niagara Falls, N. Y.; Philadelphia, Pa.; Tacoma, Wash.; N. Tonawanda, N. Y.; Worcester, Mass. *In Canada:* Hooker Chemicals Limited, N. Vancouver, B. C.

Davison Vice-Presidents

Robert D. Goodall and H. B. DeVinny have been appointed vice-presidents of the Davison Chemical Company Division of W. R. Grace & Co., Baltimore, Md.

Mr. Goodall is vice-president and general manager of the Chemicals Division. Mr. DeVinny, previously director of industrial and public relations, becomes vice-president with the same responsibilities.

•

Naugatuck Names Dr. Tuley

Dr. W. F. Tuley has been appointed to the new post of group manager of chemical development for the Naugatuck Chemical division, United States Rubber Co., New York.

In his new assignment Dr. Tuley will coordinate research and development on agricultural chemicals, rubber chemicals, heavy chemicals, chemical intermediates and chemicals used in plastics.

•

Names Two Representatives

The Spencer Chemical Co., Kansas City, Mo., has named Paul Castagno and Larry Lortscher as technical service representatives for agricultural chemicals. Mr. Castagno will work with fertilizer mixers in the Midwest, while Mr. Lortscher will service the northern national accounts, working out of Columbus, Ohio.

Mr. Castagno previously worked for Spencer as a laboratory analyst at its Jayhawk Works. Mr. Lortscher worked five years with the Battelle Memorial Institute in Columbus, Ohio, before joining Spencer.

•

Award Construction Contract

The Union Carbide Corp., New York, has awarded a construction contract for office and laboratory facilities on its Eastview property near Tarrytown, N. Y., to the Walsh Construction Co. of New York.

Union Carbide's major facilities at Eastview will include a chemicals customer service laboratory, a basic research laboratory which will house the Union Carbide Research Institute, and a four-story office building. The buildings are scheduled for completion in the summer of 1959.

H. W. Lloyd A. T. Montgomery

CSC Names Two To Sales

Harold W. Lloyd and A. T. Montgomery have joined the Agricultural Chemicals Department of the Commercial Solvents Corp., New York, as sales representatives. Both make their headquarters at CSC's Atlanta, Ga., office.

Prior to joining CSC, Mr. Lloyd represented Baugh & Sons Co., fertilizer manufacturers in New Bern, N. C. Mr. Montgomery has spent the past six years in fertilizer sales with the Virginia-Carolina Chemical Corp., Richmond, Va.

•

Reduces Price Of Uramite

The Du Pont Co., Wilmington, Del., recently announced an approximate 10 per cent reduction in the delivered prices of Uramite fertilizer compound to distributors.

This price reduction is made possible by the expanding market for Uramite on golf greens, fairways, parks, industrial grounds, athletic fields, as well as in nurseries and greenhouses, according to F. M. Jornlin, sales manager.

•

Loeffler To New Position

Alfred T. Loeffler, vice president of the Food Machinery and Chemical Corp., New York, is assuming functional responsibility for the marketing activities of the company's chemical divisions.

Mr. Loeffler will work with the divisions to extend their product lines and sales to meet the increasing needs of consuming industries, according to the company's announcement.

•

Bemis Appoints Kuder

The Bemis Bro. Bag Co., St. Louis, Mo., has appointed Dr. Robert C. Kuder to the newly-created position of technical director for the Bemis Research Laboratory in Minneapolis, Minn.

Prior to joining Bemis, Dr. Kuder was supervisor of polymer research for the Barrett Division of Allied Chemical & Dye Corp.

New Crown Zellerbach Plant

Crown Zellerbach Corporation has started production in its new $4,000,000 multiwall bag plant at Bogalusa, Louisiana.

Construction on the Bogalusa plant was started last December. It is located at the side of a paper mill operated by Gaylord Container Corp., a division of Crown Zellerbach. It can turn out over fifty million bags a year for Crown Zellerbach customers in the Southern, Midwestern and Eastern area. W. H. Maxwell is superintendent of the Bogalusa plant.

•

Co-op Fertilizer Plant

Midland Cooperatives has started construction in Waseca, Minn., for a small blending plant that will specialize in prescription fertilizer and its bulk distribution.

The building will have a two-ton fertilizer blender, scale, hopper, elevator, and storage space for 300 tons.

•

Henson, Wyatt Join Collier

Keith T. Henson and Edwin A. Wyatt have joined the agricultural technical service staff of the Collier Carbon and Chemical Corp., Los Angeles.

Mr. Henson has been assigned to testing and developing liquid fertilizer application equipment and Mr. Wyatt is a technical service representative.

•

Opens Florida Plant

Woodbury Chemical Co., St. Joseph, Missouri, has opened new insecticide plant facilities in Goulds, Florida, with Richard K. Hutchings in charge of operations.

The Export Division of Woodbury Chemical Co., under the direction of Joseph L. Flores, will also utilize the Florida facilities to supply their expanding markets in Latin America.

•

Union Bag Names Bauman

The Union Bag—Camp Paper Corp., New York, has appointed J. C. Bauman as western district manager of multiwall bag sales. He will headquarter in the company's Chicago office.

Florida Pest Control Problems Discussed at CSMA Winter Meeting

BECAUSE just about all the pests of man and households that occur over the country can be found in Florida all year round, the state provides an excellent place for the development and testing of the agricultural chemical industry's products, according to William A. Simanton, University of Florida, Citrus Experiment Station, Lake Alfred, Fla.

Mr. Simanton spoke before the Insecticide Division of the Chemical Specialties Manufacturers Association at the group's 44th annual meeting in Hollywood, Fla., Dec. 9 to 12. He said that most manufacturers maintain testing facilities in Florida or carry on some form of field trials through their technical representatives.

Florida is rapidly becoming an all-year resort. It is estimated that 1.8 million summer tourists spent $275 million in Florida this past summer. Since they arrive at the height of the insect season, Mr. Simanton pointed out, it is important that annoyance by insect pests does not deter this increasing summer tourist trade. Despite the fact that between one and two million dollars per year is spent to carry out drainage and larviciding of breeding areas, mosquitoes remain the number one problem. Mr. Simanton said that the problem is being intensified by the rapid build-up of resistance by mosquitoes in areas where intensive treatment previously had given excellent control of larvae.

Parathion at .1 pound per acre or malathion at .4 pound per acre are now the primary larvacides being used. Airplane and ground fogging of cities to kill adult mosquitoes has been carried on for a number of years, using mainly DDT in oil sprays, Mr. Simanton said.

In some areas the chlorinated hydrocarbon sprays no longer appear effective against adult mosquitoes, Mr. Simanton told the group, and in those areas malathion at .1 pound per acre is being used, although synergized pyrethrum mixtures with thiocyanates also are applied as adulticides. He added that considerable reliance must still be placed on household space sprays, windows screen treatments, and personal repellents.

Away from the developed areas, sand flies, deerflies, chiggers, and ticks, as well as mosquitoes, are likely to be encountered. Mr. Simanton cited the need for an effective space repellent for Drosophila vinegarflies, personal repellents for Hippelates eye gnats, and space sprays for Chironomid midges and tiny leafhoppers.

Mr. Simanton said that against roaches, residual sprays such as chlordane, dieldrin, and lindane seem to be generally effective. He said that the German roach in Florida seems to have become resistant to chlorinated hydrocarbon insecticides in an increasing number of areas. In those cases malathion and diazinon are being relied upon, he said, and baits containing Dipterex show promise.

Fortunately, Mr. Simanton concluded, the synergized pyrethrum insecticides continue to be effective in the majority of cases. He called this encouraging in view of the experimental evidence that such materials as lindane, diazinon, malathion, and even parathion are capable of causing resistance buildup in houseflies. These quick-action insecticides, he said, together with the more effective repellents and perhaps products based on attractants or baits, may be expected to have an increasingly important place in the specialty field.

Carroll N. Smith, Entomology Research Division, Agricultural Research Service, USDA, Orlando, talked on insect repellents at the meeting. He described the method of testing repellents at Orlando where all new compounds are screened as treatments on cotton stockings against caged yellow fever mosquitoes. The evaluation of skin repellents against mosquitoes and other biting flies includes studies of the length of time they protect against bites under normal and severe sweating conditions, their resistance to removal by rubbing and rinsing, their initial effectiveness when applied at low concentrations, and their behavior in mixtures.

In tests at Orlando, diethyltoluamide (meta isomer) proved to be outstanding as an all-purpose repellent, according to Mr. Smith. Other effective repellents listed by Mr. Smith include several substituted diethylbenzamines, ethyl hexanediol, dimethyl carbate, dimethyl phthalate, and Indalone.

Dr. H. E. Fairchild, research entomologist of the du Pont Co., Wilmington, Del., described laboratory experiments in which methoxychlor was synergized at various rates with Sesoxane. Experimental applications provided excellent control of German roaches for which methoxychlor alone has not been considered effective, according to Dr. Fairchild. In addition, he said, the synergist improved methoxychlor control of black carpet beetles, confused flour beetles, and granary weevils.

All the treatments reported by Dr. Fairchild were applied as contact sprays of acetone solutions, and conclusions were based on per cent kill in a 24-hour period. In one experiment, combinations of Sesoxane and methoxychlor gave a significant increase in the knockdown of house flies in addition to greater kill, although Sesoxane had no effect when used alone at the same rate. Dr. Fairchild said that these results suggest that methoxychlor can be useful in new ways if combined with Sesoxane.

•

Richardson Names Manager

The Richardson Scale Co., Clifton, N. J., has appointed R. W. Bagnell district manager for its New York-New Jersey area.

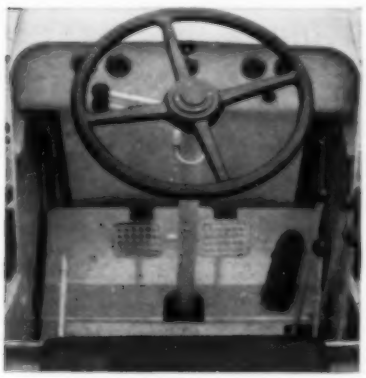
Mr. Bagnell's appointment coincides with the move of the district office to the Main Office at 668 Van Houten Ave., Clifton, N. J.

If you had to drive a car for 8 solid hours in traffic like this . . .

would you be satisfied with an old fashioned gear shift?

Even an antique car enthusiast will have to admit that a manual gearshift is a tiresome business when you're caught in a traffic jam—when you have the constant clutching, and declutching and inching along in bumper-to-bumper traffic.

Did you ever recognize the similarity between a traffic jam and a typical bulk-handling job? In both cases, the runs are relatively short, constantly Stop and Go (and in bulk handling, constantly Forward and Backward). The automobile manufacturers long ago took this burden off the driver by giving him various types of "clutchless" transmissions. Now Clark has done the same thing for the industrial Tractor Shovel operator: Clark's exclusive Power-Shift transmission on the 16 cu. ft. MICHIGAN Model 12B.



No clutch pedal, no engine clutch

The small photo at left shows the operator's compartment of the MICHIGAN Model 12B. There's a double brake pedal—operate it with either foot. There's no clutch pedal, no engine clutch, no gear clash when shifting. This heavy-duty Clark transmission is as fast and as easy to operate as a modern car—the driver merely selects High-Low-Forward or Reverse and lets the Power-Shift transmission do the work. He can make any shift while moving in either direction.

Improves operator efficiency

Power-shifting drastically reduces operator fatigue. The MICHIGAN operator doesn't have to ride a clutch all day. He can work smoothly and easily through peak periods throughout the day and still be close to top efficiency when bulk-handling runs overtime. New operators can learn to run the MICHIGAN Model 12B in a few hours. And when several operators take turns on the MICHIGAN, the machine doesn't suffer—the hydraulic-operated Power-Shift transmission provides built-in protection against "clutch riders" and "cowboys."

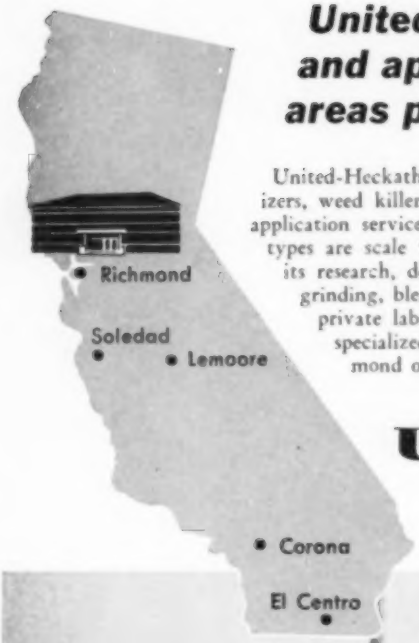
See for yourself

Without any obligation, you can put the MICHIGAN Model 12B to work on any job in your own plant. We'll bet the MICHIGAN will outproduce any loaders in its size range, bar none. You be the judge. Clip the signature below to your letterhead and mail to us—we'll make the arrangements for an on-the-job demonstration.

Michigan is a registered trade-mark of

CLARK EQUIPMENT COMPANY
Construction Machinery Division
2463 Pipestone Rd.
Benton Harbor 4,
Michigan

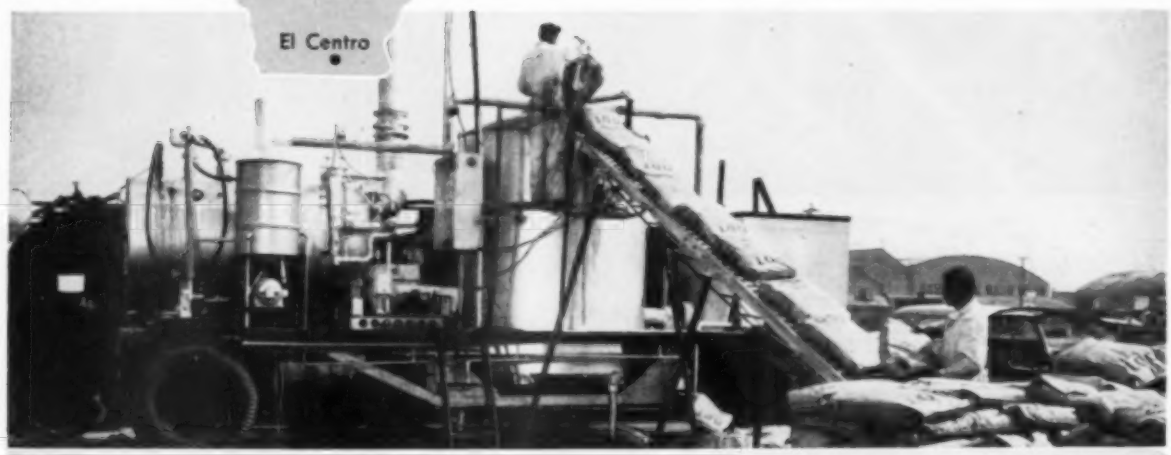
CLARK EQUIPMENT



United-Heckathorn chemical manufacturing and application facilities in key agricultural areas provide first complete local service

United-Heckathorn permanent or portable plants manufacture insecticides, fertilizers, weed killers, fungicides and fumigants on location and offer aerial or ground application service. The portable plants may be transported to your job site. Both types are scale versions of United-Heckathorn main Richmond, Calif., plant with its research, development and control laboratories . . . vast facilities for mixing, grinding, blending of dry materials and liquids for bulk sales, custom processing, private label packaging . . . engineering for construction and maintenance of specialized processing and application equipment. United-Heckathorn, Richmond or any of the affiliated plants are at your service and invite your call.

UNITED Heckathorn



Portable plant compounding chemicals for aerial spraying of beet leaf hopper on 250,000 acres of Kettleman Hills, Calif.

Main Laboratory, Richmond. Chemists, machinists and other technical supervisory personnel accompany field jobs.

Extensive ground application work and chemical sales at Soledad, Calif. in the center of the "Salad Bowl" Salinas Valley.

Packaging and delivery for sales of agricultural chemicals for citrus crops, Corona, Calif.

Formulation and application, aerial and ground, in Imperial Valley, the world's largest vegetable growing center.

Formulation of dry & liquid insecticides for San Joaquin Valley, Lemoore plant near Fresno, center of cotton, potato & grape areas.

UNITED-HECKATHORN

Main office and plant: 600 S. Fourth Street, Richmond 4, Calif.

Phone: LAndscape 5-9210

Plants at Soledad, Corona, El Centro, Lemoore

Minnesota Nitrogen Conf.

The Minnesota Fertilizer Industry committee of the Midwest Soil Improvement Committee and the University of Minnesota are sponsoring a Nitrogen Conference at the Lowry Hotel in St. Paul, Feb. 20 to 22.

About 1,000 farmers, fertilizer manufacturers and dealers, and soils research workers are expected to attend the conference which will feature a roundup of the latest information on nitrogen fertilizer use. M. H. McVickar, chief agronomist for the California Spray Chemical Corp., Richmond, Calif., will be a featured speaker at the conference and will talk on the question, "How can we work as a team to put soil fertility facts to work on the farm?"

•

Redesignate Swift Division

In order to more accurately define its mission within its parent company, the Plant Food Division of Swift & Co., Chicago, has been designated the Agricultural Chemical Division.

T. L. Adcock is marketing chief for all products of the division and W. J. Chapin is in charge of agricultural plant food marketing. B. E. Randolph is head of garden products marketing and G. E. Bruington retains responsibility for pesticides marketing.

•

Miles Joins Geigy Sales

The Geigy Agricultural Chemicals division of Geigy Chemical Corp., Ardsley, N. Y., has appointed Leo Miles as Simazin industrial sales specialist. Mr. Miles will devote his efforts to sales development and technical services for Geigy's Simazin 50W herbicide.

Prior to joining Geigy, Mr. Miles worked for the U.S. Borax and Chemical Corporation as a field representative in the New York — New England area.

•

California Weed Conference

The tenth annual meeting of the California Weed Conference, being held at San Jose on Jan. 21, 22, and 23, will include sessions on range brush and weed control, weed control in turf, lawns and ornamentals, parasitic flowering plants, and weed control research.

In addition, the conference will discuss plant injury, roadside brush and weed control on a national basis, weed control for fire prevention, mechanization and application methods, weed control legislation, what is new in weed control, and the future of weed control. President of the conference will be Dr. Vernon I. Cheadle, chairman of the botany department, University of California, Davis.

American Ag. Names Three

The American Agricultural Chemical Co., New York, has announced three personnel changes in its fertilizer sales and production departments.

R. T. Gravitte has been named assistant manager of sales at the Cincinnati, O., fertilizer plant. R. T. McFerson was named manager of sales at the Fulton, Ill., fertilizer plant. And W. A. Glover is production superintendent at the Columbia, S.C., fertilizer plant.

TVA Commended — and Criticized on Fertilizer Demonstration Program

THE Tennessee Valley Authority has just made public a report on TVA's Fertilizer Distributor Demonstration Program which follows an intensive 10-month survey conducted by a group of eleven consultants named by TVA to make an objective study of TVA's fertilizer distribution policies. While members of the consulting group agree that farmers of the Nation have benefitted generally from the TVA fertilizer program, there are sections of their report which are highly critical of some of the policies which TVA, TVA wholesalers and TVA fertilizer dealers have employed. One of the major criticisms expressed in the report is that "the amount of fertilizer distributed . . . has exceeded that which can be justified solely on the basis of education."

In making the report public, TVA acknowledges the validity of some of the criticism expressed and observes that "because of the relatively short time the program has been in effect and the rapidly changing fertilizer situation, it would be surprising" if there were not areas in which improvement of the Distributor Demonstration Program would not seem to be required. However, in their own comment on the report, TVA officials seem unresponsive to the adoption of some of the policy changes suggested by their own appointees.

In their report the consultants advanced 32 specific recommendations. TVA officials accept 26 of them "without question," but indicate that they have "some reservations or comments about the remaining six."

They point out, for example, that "production at an exact level to meet educational requirements fully, but no more, is an extremely difficult task." Closer adjustments, they indicate, are not possible at the moment, but they express a willingness to "re-examine the situation periodically to assure that production levels and requirements of the educational program are consistent."

One recommendation of the consulting board, with which apparently TVA does not agree, is that specific time limits should be fixed for the period during which a newly developed material should be included in the demonstration program, and the time an individual farmer can obtain fertilizer for a particular use. While agreeing in general with this principle, the TVA comment is that "TVA does not believe that hard and fast, arbitrary time limits can be set for the distribution of a new material in the program or for an individual farmer's participation." The consultants had suggested that eight years be the maximum time a newly developed material should be included in the program, and three years the limit for a single special use of a particular material on a particular crop by an individual farmer.

Nor does TVA agree with the recommendation that it should not use fertilizers in the program which are inferior in quality to those commercially available. (The reference here is to TVA's ammonium nitrate which has generally been characterized as exhibiting decidedly inferior handling qualities). The TVA view on this point is that its vacuum crystallization process for producing ammonium nitrate is cheaper and safer than the prilling process employed by commercial fertilizer producers, and that "through intensification of experimental work on improving the quality of its crystalline product, TVA expects to solve this problem within a reasonable time through process improvements."

TVA also seems disinclined to go along with the recommendation that it discontinue distributing in its demonstration program mixed fertilizers of types readily available commercially. "TVA feels that this recommendation does not give sufficient weight to the fact that improved mixing technology and the more efficient use of raw materials in the manufacture of high analysis mixtures offer very inviting possibilities for reducing the cost of plant nutrients to the farmer."

Some reservation is expressed by TVA officials to the suggestion that the geographic spread of materials should be extended, avoiding the present tendency in some cases to concentrate materials in particular areas (TVA materials make up as much as 50% of the total fertilizer used in certain areas.) To this criticism, TVA replies that, while dispersion is important, "the prime criterion as to quantity should be the amount necessary to carry on an effective educational

Highlights of Committee's Report

. . . Wholesale distributors of TVA fertilizers believe overwhelmingly that the program has increased the use of high analysis straight materials, and has led to more intelligent use of all fertilizers. Believe more fertilizers of all types have been used as a result of the program.

. . . TVA farmers increased their use of both TVA materials and commercial fertilizers. Did not substitute TVA materials for commercial materials, but increased use of both at about same rate.

. . . 86% of TVA wholesale distributors have agreements with dealers on how TVA materials should be used, but 14% do not.

. . . Two-thirds of the dealers satisfied with present program. One-seventh were openly critical.

. . . Only 45% of TVA retail dealers have any written agreements with their distributors on use of TVA materials.

. . . About 33% of TVA dealers keep no records of which farmers have purchased TVA fertilizers.

. . . TVA farmers used a significantly greater proportion of nutrients on forage crops than did non-TVA farmers.

. . . TVA farmers used 20% more pounds of nutrients per acre than non-TVA farmers. Rate of nitrogen used almost twice that for non-TVA farmers.

. . . TVA farmers indicated they were furnished much more educational material by their dealers than were non-TVA farmers.

. . . Approximately 44% of TVA farmers contacted reported they did not have any specific agreement with their dealers as to how TVA fertilizers are to be used.

program geared to the requirements of particular areas."

A number of the recommendations of the consulting group had to do with pricing policies on TVA fertilizers, closer policing of advertising copy, the necessity for written agreements, more adequate reporting of sales, etc. TVA apparently accepts its committee's views on these matters, for no disagreement is expressed in the TVA statement which accompanied release of the report. The consulting group were particularly emphatic in their observation that steps must be taken to prevent the demonstration program from becoming "simply a method for underpricing competition, or for attaining tie-in sales, etc." (Some dealers, it was disclosed, have insisted on the purchase by their farmer customers of non-TVA fertilizers as a basis of eligibility to purchase TVA fertilizers.)

The committee further suggested that all advertising and promotional efforts by distributors and dealers which relate to TVA fertilizers should mention and emphasize the limited special uses for which they qualify, "to prevent 'bargain sales' of TVA materials for non-educational uses."

It suggests further that written agreements should be required between wholesale distributors and retail dealers, that each distributor should report to TVA annually on the destination and use of all TVA materials, and finally, that "TVA should strengthen its procedures for the detection of program violations and their prompt disposition. Serious or chronic violations should result in cancellation of the distributor's contract with TVA."

As for dealers, it is recommended that they be required to keep readily available, accurate records of amounts and kinds of materials sold, and names of buyers; that each purchaser be required to sign a statement indicating his intended use of TVA fertilizers in the manner specified by the list of qualified uses; and finally that the dealer must restrict the total quantity of TVA material sold to any one farmer or for any specific use in accordance with the quantity and time limits specified in the program for his state.

TVA Reports for '57

The annual report of the Tennessee Valley Authority for 1957, discloses that production of fertilizers by the TVA remained relatively constant during the year.

Production of concentrated superphosphate, however, was sharply cut back and some of the newer fertilizers, such as calcium metaphosphate and diammonium phosphate, were produced in larger amounts in 1957.

Eight states entered or reentered TVA's farm test-demonstration program and, at the close of the year, a total of 28 states were participating.

Committee Members

The committee of eleven members included three educational specialists in agricultural economics, statistics, and public administration; four land grant college agronomists; and four representatives of distributors of TVA fertilizers. They are:

Earl O. Heady, professor of agricultural economics, Iowa State College, chairman

R. J. Jessen, professor of statistics, Iowa State College

W. R. Parks, professor of public administration, University of Wisconsin

M. D. Weldon, extension agronomist, University of Nebraska

J. C. Lowery, extension agronomist, Alabama Polytechnic Institute

M. B. Russell, head of agronomy department, Univ. of Illinois

N. C. Brady, head of agronomy department, Cornell Univ.

John Sims, Consultant, Ohio Farm Bureau Cooperative Association

Arthur M. Smith, assistant to the vice president, Plant Food Division of Olin Mathieson Chemical Corp.

Howard Parker, president, Sylacauga Fertilizer Co.

Howard Thulbery, sales manager, Superior Fertilizer and Chemical Co.

The number of active test-demonstration farmers increased from 3,066 in 1956 to 3,591 in 1957. The test-demonstration farms used about 13,500 tons of TVA fertilizers during the year.

The largest portion of the output of TVA's demonstration scale plants continued to go into the distributor-demonstration program. In this program, designed to introduce new fertilizer materials to farmers, the fertilizers are made available for sale through cooperative and commercial fertilizer distributors.

At the end of 1957, the sixth year of the program, a total of 71 distributors operating in 31 states were participating actively in the program. They included 53 wholesale cooperatives, including members of three regional cooperatives, and 18 industry firms. TVA sold 251,000 tons of fertilizers for use in the program during the fiscal year 1957.★★

CONCLUSIONS Reached by the Committee concerning the TVA Distributor Demonstration Program

1. **The Distributor Demonstration Program has made a major educational contribution to fertilizer use.**
2. **It has been effective in increasing the use of fertilizers and materials.**
3. **It has been effective in increasing the production of lower cost, higher analysis mixed fertilizers**
4. **It has been an effective method of introducing new fertilizer materials.**
5. **As a group TVA dealers are satisfied with the program both for themselves and their farmer customers.**
6. **Lower cost materials have been an important factor in encouraging dealers and farmers to participate in the program.**
7. **Although over-all attainment of the educational objectives of the Distributor Demonstration Program has been good, its effectiveness could be substantially improved.**
8. **Within the framework of the present objectives and organizational structure the amount of fertilizers distributed under the demonstration program has exceeded that which can be justified solely on the basis of education.**
9. **Factors other than the stated educational objectives have played a determining role in establishing the tonnage of materials distributed.**
10. **A few flagrant violations of required program procedures have shaken confidence in the Distributor Demonstration Program in some localities, and have resulted in justified criticism of the program, especially by certain individuals in the fertilizer industry.**

Home Gardeners' Chemical Uses Up In 1957

FARMERS used about the same volume of pesticide chemicals in 1957 as in 1956, while the volume of these chemicals used by home gardeners and others increased slightly during the year, the National Agricultural Chemicals Association reported recently.

Total sales of basic pesticide chemicals are estimated at $250 million for 1957. This is equal to the record high sales attained in 1956. Approximately 60 percent of the industry's sales are to farmers, 20 percent to non-farm users (including home gardeners), and 20 percent are in exports.

Major market developments for the industry during the year, according to the NAC, were:

1) Growing interest of foresters in using chemicals in forest conservation. Forest insects and diseases are now killing nine times as much timber as forest fire, causing a critical problem both for the $20 billion forest products industry and for forest conservationists.

2) Wider use of chemical insect, plant disease and weed control in home gardening and lawn care bolstered by expanding suburbs and increased leisure time for gardening.

3) A steady growth in exports, particularly to undeveloped areas of Asia and Africa where improved pest control is the key to increased food production and to improving public health through control of disease-carrying mosquitoes, flies, and rats.

4) Growing importance of aerial application of pesticide chemicals in agriculture and in forest maintenance. More than 7,500 airplanes flew an estimated 1,000,000 hours in aerial application in 1957 compared with 700,000 hours flown for this purpose in 1951.

5) Small but steady increases in the relatively new uses of pesticide chemicals to protect elm trees against damage from Dutch elm disease; control brush, weeds and noxious plants along highway roadsides, and protection of park visitors through control of tormenting insects and injurious plants such as poison ivy in public parks.

•

Expanding Research Program

Construction has started on five new buildings to be used in Abbott Laboratories' expanding agricultural research program. The buildings are being erected on the company's research farm near Mundelein, Ill.

The expanded research program at the farm will include studies of animal nutrition, animal health, and crop growth. The experiments will be supervised by Henry C. Spruth.

Large-scale, field-type studies in poultry, swine, and cattle of possible new animal growth stimulants, hormones, antibiotics, tranquilizers, and other materials will be conducted at the farm by Abbott nutritionalists.

Dow Field Specialists

Robert P. Harrison and John R. Fisher have been appointed field specialists in agricultural chemical development for The Dow Chemical Co., Midland, Mich.

Mr. Harrison will make his headquarters in Washington, D. C., and will be engaged in research and development work on insecticides, soil fumigants, space and commodity fumigants, fungicides and veterinary and feed chemicals.

Mr. Fisher's headquarters will be in Seattle, Washington. His territory will include Washington, Oregon, Idaho and Montana.

•

Six Win Hercules Awards

Six national winners of $400 college scholarships in the National 4-H Entomology Awards Program were announced at the 36th National 4-H Club Congress in Chicago last month.

The Entomology Awards Program is sponsored by the Hercules Powder Co., Wilmington, Del. The six scholarship winners are: Joe W. Simmons, California; Larry Ulmer Jr., Delaware; Jack Jewell, Kansas; Howard E. Breland, Mississippi; Jesse Malone Jr., Montana; and David C. Johnson, Virginia.

•

Roadside Weed Control

Jay Shideler, highway superintendent of Huntington County, Indiana, was a speaker at the fifth annual National Highway Conference for County Engineers and officials held in French Lick, Ind., Oct. 28 to 30, and talked on chemicals for roadside vegetation control.

•

Glyodin As Wetting Agent

Tests recently conducted at the Michigan Agricultural Experiment Station indicate that Glyodin fruit fungicide, at its regularly recommended minimum dosage of 16 fluid ounces per 100 gallons of spray, frequently will "serve as a wetting agent to improve the effectiveness of other chemicals used in the same spray mixture," according to Dale W. Kretchman and Dr. Arthur E. Mitchell, Department of Horticulture, Michigan State University, who made the experiments.

As a commercial fruit fungicide, Glyodin is used in sprays to combat diseases attacking apples, cherries, and peaches. Mr. Kretchman and Dr. Mitchell state that reports of "improved effectiveness of certain chemicals against insects and plant feeding mites from the inclusion of Glyodin may be attributed, in part, to the wetting action of Glyodin."

Union Carbide Chemicals Com- New York, is the manufacturer of Glyodin.

Climax Strike Ends

The five-month strike at the Langeloth, Pa. plant of the Climax Molybdenum Co. New York, has been settled. An agreement was concluded with Local No. 1311 of the UAW last month.

The plant did not begin full production immediately. Production of technical molybdic oxide was not anticipated prior to the first of the year. Ferromolybdenum production will start at later date.

Equipment, Supplies, Bulletins

Portable Bagging Scale

The Richardson Scale Co., Clifton, N. J., is offering their high-speed bagging scale (Model E-50) in a floor portable style. Mounted on a heavy-duty frame set on casters, the new unit can be moved to serve many bins on one floor.

An additional new feature is the inclusion of an eye-level counter for tallying the number of bags filled. The scale is fitted with a quickly-detachable and changeable bag spout to accommodate 25-lb., 50-lb., or 100-lb. bags.

•

Report on Methionine

E. I. du Pont de Nemours & Co., Wilmington, Del., has prepared a booklet on the improvement of protein quality of turkey feed by adding methionine. The booklet deals with the importance of amino acid compositions of protein mixtures in meeting the particular needs of turkeys.

The booklet contains tables and graphs depiciting various ratios and levels of protein needs in growing turkeys.

•

Eastman Technical Report

Eastman Chemical Products, Inc., Kingsport, Tenn., has issued a technical data report on Isobutyronitrile properties and applications. The new reactive chemical intermediate is now available in commercial quantities.

Isobutyronitrile is produced by the Texas Eastman Co. a manufacturing division of the Eastman Kodak Co., in recently expanded facilities at Longview, Texas. Among the possible end-use applications suggested by the properties of Isobutyronitrile are agricultural fumigants.

•

New Wire Belt Conveyor

A new woven wire belt conveyor for hauling bags of cement, lime, talc and other bulk materials has been developed at the Korb-Pettit plant of Hewitt-Robins, Inc., near Philadelphia.

The conveyor's principal use is to take bags that have been filled by an automatic loading device and carry them to a shipping area or other destinations, according to the manufacturer. The design features a set of adjustable spring shock absorbers which support the roller platform and eliminate bag breakage.

Geigy Diazinon Manual

The Geigy Agricultural Chemicals division of the Geigy Chemical Corp., Ardsley, N. Y., has published a pest control operator manual containing complete technical information concerning Diazinon.

Among other things, the manual contains toxicological data together with the blood cholinesterase measurements of pest control operators engaged in the use of diazinon. Geigy label claims now include Brown Dog ticks, fleas, and silverfish in addition to the already established claims for control of cockroaches, flies, and ants. In addition, claims are now approved for the control of fleas and chiggers infesting lawns and other outdoor areas.

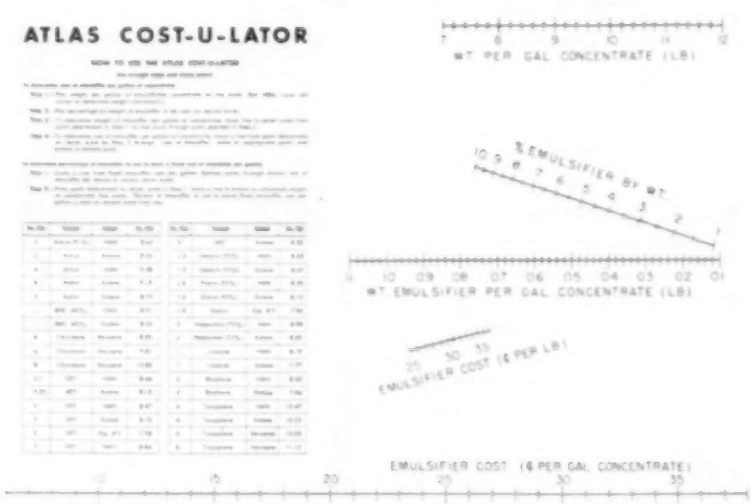
•

New Indulin Bulletin

The Polychemicals Division of the West Virginia Pulp and Paper Co. Charleston, S. C., is offering a new technical bulletin that contains information on Indulin, a unique surfactant, extender, dispersant, reinforcent, binder, sequestering agent, emulsifier, emulsion stabilizer, and protective colloid.

Complete with illustrations, charts, and tables, the 20-page brochure details many uses for Indulin.

Atlas Chart For Plotting Cost And Percentages



The Atlas Powder Co., Wilmington, Del., has prepared a handy chart for computing the cost of emulsifier per gallon of concentrate and the percentage of emulsifier to use to meet a fixed cost of emulsifier per gallon. Costs and percentages are derived by plotting the weights, as listed in the tables at the left, on the scales at the right.

St. Regis Super Stepped Bag

The St. Regis Paper Co., New York, is offering a "super stepped" multiwall bag that is said to provide added strength and sift-proofness.

The new bag is manufactured with the plies slit in staggered positions instead of the same position as in previous multiwall bags. For example, in a four-ply "super stepped" bag, the plies of the bag are staggered as for the regular stepped end bag, and then the slits made to form the top and bottom are staggered in three different positions. Glue is applied and the plies are pasted together. Since each of the three inside plies is bonded together, as well as the outside ply, a tighter bottom closure results.

In addition, St. Regis has developed a new valve insert to insure smooth operation when the bag is placed on the tube of the packer.

•

Bradson Spray Guns

The Bradson Co., San Diego, Calif., has introduced two new models to their line of garden hose spray guns.

The Bradson Pest Gun, with a six-gallon capacity, provides a fine spray for insecticides, and the Bradson Grass Gun, with a 20-gallon capacity, delivers a full spray for fertilizing lawns.

•

Seed Treatment Booklet

Panogen Inc., Ringwood, Ill., is offering a booklet, titled "The Benefits of A Modern Seed Treatment," that lists the conditions under which seed treatment is likely to be profitable.

The 16-page booklet is illustrated and tells how and when to treat seeds, listing some specific crops such as wheat, oats, and cotton.

•

O-M Industry Booklet

The Industrial Chemicals division of Olin Mathieson Chemical Corporation has issued a 16-page booklet describing the characteristics, grades and containers for 24 basic chemicals used by industry.

The booklet contains information on organic, inorganic and specialty chemicals, and lists the location of the production points for each product.

Copies of the booklet are available from Olin Mathieson Chemical Corporation, Industrial Chemicals division, Baltimore 3, Md.

•

Compressed Air Dryers

Van Products Co., Erie, Pa., is offering a 12-page bulletin describing the Van-Air Dryers for moisture control in compressed air.

A special drying agent, Dry-o-Lite, dehumidifies the compressed air as it passes through the dryer, making it thoroughly "instrument clean, dry, and safe." The capacities of 23 standard models are shown in the bulletin which also includes capacity and sizing graphs.

•

New Dow Products Catalog

The Dow Chemical Co., Midland, Mich., is offering a 1957-1958 edition of its general products catalog that includes information on properties and uses of some 375 of Dow's basic industrial, pharmaceutical, and agricultural chemicals.

Detailed information is presented in tabular form and descriptive information is included on principal product groups.

•

Aerosol Sheep Dye

The Du Pont Co., Wilmington, Del., has developed an aerosol fleece-marking formulation that consists of lanolin, wood resin, naphtha, odorless mineral spirits, and a violet dye. The dye is expected to ease the sheep herder's identification problem at breeding time and in sorting the flock into sale lots.

The recommended formulation for aerosol packaging provides a pencil-like jet of dye which at a distance of 12 inches from the fleece, makes an indelible mark about one inch in diameter.

•

New Bemis Bagger Bulletin

A four-page bulletin describing the new Rapid-Weigh Bagger for fertilizer is available from the Bemis Bro. Bag Co., St. Louis, Mo.

The bulletin contains performance and engineering data on the

bagger which fills bags with pelleted, granular, and meal type fertilizers at speeds up to 24 bags per minute.

•

Panogen Seed Treatment Kits

Panogen Co., Ringwood, Ill., is offering a series of five inexpensive "dust-to-Panogen" conversion kits. With the help of one of these kits, the owner of a dust treater, grain-loading auger, or any other system which adequately mixes seed, may now use liquid Panogen seed treatment. The kits are designated Models DTC-2, DTC-3, DTC-4, DTC-5, and DTC-7.

The Model DTC-2 is designed for gravity feed from elevated drums or containers. Models DTC-4 and DTC-3 are designed primarily for use where the container of liquid is in a high or otherwise inaccessible location. Model DTC-5 has no reservoir since the liquid is circulated by use of a pump rather than gravity, and the DTC-7 is recommended mainly for farm use or low-volume custom treating.

Soil Testing Instrument

University of Wisconsin soils specialists have designed an instrument which they believe opens up new possibilities in soil research. Serving many of the purposes of the commonly used lysimeter, it is described as "merely a disk made of porous abrasive material and set in the soil where measurement is desired." The disk is connected by plastic tygon tubing to a bottle about four feet lower in the soil. This difference in depth exerts a known amount of pressure on the abrasive plate, drawing excess moisture out of the soil above the plate.

Another tygon tube extends from the bottle to the soil surface where a hand pump can suck the moisture from the underground bottle into another bottle that can be carried to the laboratory. D. W. Cole, who designed the device in collaboration with S. A. Wilde, points out that one advantage of the instrument is that the soil being measured is not disturbed. It does not become saturated with water and the water is easily collected with little danger of loss. He expects wide use of the device for measuring percolation of water and losses of nutrients in soils treated with commercial fertilizers and subjected to different cultural practices.

•

Dow Farm Film

The Enemy Underground, a new motion picture on chemical control of Johnson grass in cotton fields, will be introduced at the National Weed Control Conference in Memphis, Jan. 13. The film was produced by the Dow Chemical Co., Midland, Mich.

The film is a 12-minute, color production telling the story of effective control of Johnson grass with spot treatments of Dowpon. It was filmed in the field with most shooting taking place in the Mississippi Delta area. The Carolinas and California also are shown.

Following the introductory showing, the film will be made available for public showings at farm meetings, schools, and other groups.

BREVITIES

CHEMAGRO CORP., New York, has appointed T. G. Lewton Jr. to head its newly-created Market Development Section. Mr. Lewton previously served in a sales and marketing capacity in Chemagro's Western Sales Region. In his new position, he is located at Kansas City, Mo., where Chemagro is constructing research laboratories and a manufacturing plant.

AC

RUSSELL L. HADEN JR., a former executive of Dewey and Almy Chemical Co. in Cambridge, Mass., has been named general manager of the Chemicals Division of Virginia-Carolina Chemical Corp., Richmond, Va.

AC

WALTER C. DUTTON, formerly an assistant director of agricultural chemicals research for the Dow Chemical Company and serving in a consultant capacity for the past three years, retired last month.

AC

HENRY OWENS has installed a wholesale liquid fertilizer plant at Lewis, Kansas. The installation includes mixing and storage tanks.

AC

DOGGET-PFEIL CO., Springfield, N.J., was ordered to cease manufacture of fertilizer and insecticides at its new plant by the Township Committee. The committee acted on the basis of a legal opinion stating the company was violating zoning ordinances.

AC

C. PARK HANNEMAN, a vice president and director of the Penola Oil Co., New York, died recently in Ridgefield, Conn., after a brief illness. He was 51 years old.

AC

RAYMOND FAGAN has joined the sales division of the Werthan Bag Corp., Nashville, Tenn., covering the state of Alabama. He was previously sales representative of the Virginia-Carolina Chemical Corp., Richmond, Va.

AC

EDWIN R. BARLETT, chairman of the finance committee and a director of Hooker Electrochemical Co., Niagara Falls, N. Y., died suddenly last month of a heart attack at his winter home in Siesta Key, Sarasota, Fla. Mr. Bartlett was president of Hooker from 1945 to 1951 and was board chairman until 1955.

AC

DR. KENNETH G. CLARK of the United States Department of Agriculture has been elected chairman of the American Chemical Society's Division of Fertilizer and Soil Chemistry for 1958. Dr. Clark is senior chemist with the Soil and Water Conservation Research Branch of the Agriculture Department's Bureau of Plant Industry, Beltsville, Md.

AC

WARREN A. POST has been appointed manager of brands development for O. M. Scott & Sons, Marysville, Ohio. Mr. Post had been west coast manager for the lawn seed firm for seven years.

AC

GEORGE W. MERCK, chairman of Merck & Co., Inc., Rahway, N. J., died last month of a cerebral hemorrhage that he had suffered at his home in West Orange, N. J. His age was 63.

AC

F. H. WOODRUFF & SONS, Inc., a 79-year-old seed company of Milford, Conn., will become a division of Associated Seed Growers, Inc. of New Haven, if stockholders approve an agreement signed by a majority of the directors of both companies.

ERWIN H. KLAUS has joined Ravel Brothers, Inc., farm and garden supplies distributors, Albuquerque, New Mexico, as sales manager. He was formerly marketing director of Northrup, King & Co., seed wholesalers.

AC

JOHN H. MACDONALD has joined the technical staff of S. B. Penick & Co., New York. He was previously plant manager of Nepera Chemical Company's Harriman, N. Y. plant and superintendent of manufacturing at Merck & Company's Danville, Pa. plant.

AC

C. E. WORKMAN, field sales manager of the Fertilizer Division of the Virginia-Carolina Chemical Corp., Richmond, Va., resigned last month. Mr. Workman, who has been associated with V-C for 21 years, said his future plans were indefinite.

AC

CLAUDE L. WELCH, head of the National Cotton Council's production and marketing division, has been named 1957 "Man of the Year in Service to Southern Agriculture" by *Progressive Farmer* magazine. He was cited for "notable service in the field of cotton production and marketing."

AC

MICHIGAN CHEMICAL CORP., Saint Louis, Michigan, has declared an annual dividend of 25 cents a share on its common stock plus a 4 percent stock dividend. This is the first dividend which has been paid by the company in its twenty-two years of operation.

AC

THE 26TH ANNUAL Long Island Potato Growers' Convention will be held at Riverhead, L.I., on Jan. 28 and 29. The 23rd annual Suffolk County (Long Island) Vegetable and Cauliflower Growers' Convention also will be held at Riverhead on Jan. 25 and 16.

AC

THE ILLINOIS STATE ACADEMY OF SCIENCE will hold its 51st annual meeting on the University of Illinois campus, Urbana, May 8, 9 and 10. A feature of the meeting will be observance of the 100th anniversary of the founding of the Illinois Natural History Survey, which is located on the campus.

AC

THE THOMAS J. HEADLEE Fellowship Fund, devoted to fundamental research in entomology, now stands at $45,465.93, according to Harold Rife of Boyle-Midway, Inc., Cranford, N. J., who reported to the advisory council at Rutgers University.

AC

J. ALBERT WOODS, president of the Commercial Solvents Corp., New York, was elected chairman of the New York Chapter, American Red Cross, at its 51st Annual Meeting held at the Barbizon-Plaza Hotel, New York City, Oct. 31.

AC

AGRICULTURAL CHEMICAL APPLICATORS will have an opportunity to go to school again when the seventh annual short course, sponsored for them cooperatively by the Oregon State Department of Agriculture and Oregon State College, is held at the college in Corvallis January 27 to 31.

AC

NOVAMONT CO., a new firm, has been organized to acquire land in Wayne County, W. Va., for the Montecatini Chemical Co. of Italy. Montecatini already has acquired options on 200 acres near Neal, W. Va. and it is assumed that the company plans to build a new chemical plant at the site.

AC

DR. JOHN R. BROWN, JR., former vice president for research and development of the Spencer Chemical Co., Kansas City, Mo., has been elected a director and vice president in charge of research and development for the Colgate-Palmolive Co.

AC

THE MISSISSIPPI CHEMICAL CORP. has awarded contracts totaling $1.2 million for the construction of additional nitric acid and ammonium nitrate production facilities at the company's Yazoo City plant. The new facilities are scheduled to begin operations by Feb., 1958, and will increase ammonium nitrate production by 17,500 tons per year.

COMMERCIAL INDUSTRAL CAJEME, Cd., Obregon, Mexico, a distributor plant started operation recently. The operation is under the guidance of the R. T. Collier Carbon & Chemical Corp., Los Angeles.

AC

ATLAS POWDER CO., Wilmington, has established a toxicology section in its Chemical Research Department to carry out research on the safety of Atlas products from the standpoint of handling, use, and consumption.

AC

THE HUKILL CHEMICAL CORP. will serve as technical sales representative of the Sole Chemical Corp., Chicago, in Ohio, western Pennsylvania, and the southern half of Michigan.

FERTILIZER CONSUMPTION

(From Page 36)

The three per cent decrease in the South Atlantic region is the same as the percentage decrease in use of fertilizer in this region.

The total consumption of primary plant nutrients supplied by mixed fertilizers is estimated to have been 4,296,000 tons, comprising 841,000 tons of nitrogen, 1,772,000 tons of available P_2O_5, and 1,683,000 tons of K_2O. These quantities represent 44,000 tons (5.5%) more nitrogen, 28,000 tons (1.7%) more K_2O, and 13,000 tons (0.7%) less available P_2O_5 than was used in 1955-56. Materials used for direct application supplied 1,284,000 tons of nitrogen, 471,000 tons of available P_2O_5, and 252,000 tons of K_2O, representing increases of 148,000 tons (13.0%) for nitrogen, 9,000 tons (1.9%) for available P_2O_5, and 32,000 tons (14.5%) for K_2O as compared with 1955-56. The trend to mixed fertilizers having relatively lower available P_2O_5 content has caused an annual decrease in the national consumption of available P_2O_5 since 1954-55 in spite of the increased use of higher analysis phosphate bearing materials.

The increase in tonnage of plant nutrients was highest in the West North Central and East North Cen-

already planted and crop to be

Arkansas Foundry Co., Little Rock:

tral regions. Their combined tonnage showed an increase for nitrogen, 89,000 tons; available P_2O_5, 26,000 tons; and K_2O, 49,000 tons.

The national weighted average of the primary plant nutrients contained in mixed fertilizers as shown by this preliminary analysis in 1956-57 was for nitrogen, 5.77 per cent; for available P_2O_5, 12.16 per cent; for K_2O, 11.55 per cent; and for the total of these nutrients, 29.48 per cent. The corresponding values in the preceding year were 5.39, 12.08, 11.20, and 28.67 per cent. The proportionate increase was highest for nitrogen and lowest for P_2O_5.★★

ALABAMA PESTORAMA

(*From Page 37*)

N. R. Downey, chairman of the local arrangements for PEST-O-RAMA, states that Montgomery has good hotel, motel, and restaurant facilities. Reservations should be made immediately.

Some of the commercial firms that have already completed plans for exhibits include:

Agricultural Chemical Service Co.
Alabama Calcium Products
American Cyanamid Co.
Broyhill Equipment Co.
Bemis Bros. Bag Co.
California Spray Chemical Corp.
Cardinal Pest Control
Dow Chemical Co.
Diamond Black Leaf Co.
Farmers Marketing and Exchange Association
Frontier Chemical Co.
General Chemical Div., Allied Chem.
Hercules Powder Co.
John Bean Division, FMC
Ker-Dan, Inc.
Monsanto Chemical Co.
Niagara Chemical Division, FMC
New Ideal Sprayer and Equipment Co.
Olin Mathieson Chemical Corp.
Penn Salt Mfg. Co.
Stevens Industries
Southland Dusting Co.
Stauffer Chemical Co.
Shell Chemical Corp.
Taylor Chemical Co.
Velsicol Chemical Corp.
Wilson Air Service
Woolfolk Chemical Works

AAI CONVENTION

(*From Page 41*)

AAI registrants were interested in information on storing, handling, and applying this material. It was observed that anhydrous ammonia dealers are looking toward marketing a higher plant food application per acre, in an effort to improve their competitive position in the industry.

Among the technical problems in handling the two materials (phosphoric acid and anhydrous ammonia), are storing and application. Several firms already offer units which apply the two liquids simultaneously through two different knives entering the soil to different depths. Rubber lined tanks, or tanks fitted with newly developed plastic liners are suitable for storing phosphoric acid, and acid pumps handle transfer.

Credit and Finance

NEXT to the job of actually making sales . . . probably the second most important question is that of collections, credit and finance. Discussion at the accounting and price analysis roundtable confirmed this fact, as participants exchanged ideas and experiences in estimating operational costs, lowering operating costs, extending credit, etc.

The agricultural chemicals industry in general agrees that credit should not be part of the dealer's service . . . that credit and mortgages should properly be handled by bankers, and that the distributor and dealer should not assume banking responsibilities. Some dissatisfaction was expressed with the competitive pressure often applied against organizations that refuse to sell the farmer on credit.

An interesting program combining credit and cash sales was outlined by one Kansas supplier who has found a way of selling successfully on a credit basis. He reports he has had no financial loss over the four-year period he has operated the program.

Briefly, Mr. Kansas sells on credit, charging the farmer a straight 4% interest, and takes a lien on crop

D. D. Bondarenko, weed control

committees of the House Appropria-

already planted and crop to be planted. He immediately discounts his note at the bank, putting up 10% of the note value in a reserve fund, which is refunded to him when the note is paid. In this way, all his sales are recorded as cash sales in his records, eliminating a bookkeeeping problem . . . the extent of his liability is the 10% in reserve at the bank . . . he has no collection and bookkeeping problem, since this is assumed by the bank. Mr. Kansas stated that the average note runs for $800-1000, and is due 30 days from date of harvest. (Example, a note on a wheat crop harvested in July is due in August; a sorghum crop harvested in October, is due in November.)

Questioned on the program, Mr. Kansas reported he sells distributors in three counties, handles liquid and dry fertilizer, takes 2nd liens only with approval of the first mortgage holder, and insists on priority.

The local banks are completely in favor of the program, he reported, and as a matter of fact are asking him for some part of the business. From a banker's viewpoint, the better credit risk is a loan of a half-million or so extended over several counties in small notes on many crops, rather than a bulk loan of that amount to a single party.

Starting the program with a bank, he indicated, may be a little difficult, but after it's under way, and a number of notes are in the bank, the 10% reserve accumulates to represent substantial protection for the bank.

AAI representatives continued similar discussion at the insurance round table, reviewing comprehensive policies, escape insurance, workmen's compensation, general liability, etc.

The Trade Show

EQUIPMENT currently available for shipping, storing, handling, transferring, and applying anhydrous ammonia, and phosphoric acid were featured in the trade show exhibit auditorium. Tanks, nozzles, hose, valves, application units, trailers, etc., were among the equipment displayed. The following exhibitors made up the trade show:

Arkansas Foundry Co., Little Rock; Arrow Equipment Co., Memphis; Barnard & Leas Mfg. Co., Cedar Rapids, Ia.; Bastin Blessing Co., Chicago; J. B. Beaird Co., Shreveport, La.; Bell Mfg. Co., Inverness, Miss.; John Blue Co., Huntsville, Ala.; Boettcher Supply Co., Beloit, Kans.; Clark Mfg. Co., Atherton, Mo.; Continental NH_3 Products Co., Dallas; Corken's Inc., Oklahoma City; Dallas Tank Co., Dallas; Dupont Co., Wilmington; Gas Equipment Co., Dallas; Gates Rubber Co., Denver; Hewitt Robins, Buffalo; Marsh Instrument Co., Skokie, Ill.; Mid-South Chemical Corp., Memphis; Monsanto Chemical Co., St. Louis; Newell Brothers Machine Co., Vincennes, Ind.; Olin Mathieson Chemical Corp., Little Rock; Pollard Mfg. Co., Minneapolis; Prior Products Co., Dallas; S & M Co., Gardena, Calif.; Squibb Taylor, Dallas; Superior Steel & Malleable Castings, Benton Harbor, Mich.; Taylor Machine Works, Louisville, Miss.; W & A Mfg. Co., Pine Bluff, Ark.; Weatherhead Co., Cleveland; and Y-V Fertilizer Co., Montana.★★

COTTON CONFERENCE

(*From Page 31*)

ing out the best-known fertilizer and lime practices; and (3) to increase farm, industry, and business income by sound fertilization methods.

"Our primary goal is to help farmers become more efficient, to raise their standard of living, and to enlarge their chances of success," Dr. Wehunt said. "The need to encourage efficiency in cotton production, as well as other crops, was never more important than today."★★

OHIO PESTICIDE INST.

(*From Page 58*)

layby treatments of vegetable fields to minimize weed problems in the harvest period. The two best on potatoes and tomatoes in his test were Diuron and GC 2603. Simazin protected potatoes from most common annual weeds for from six to eight weeks, he reported.

Still the outstanding chemical for controlling the Japanese beetle is DDT, according to Dr. J. B. Polivka. He has tested it against three other chemicals in the past two years and it gave the highest per cent of control—98%—on roses.

PHOSPHORIC ACID

The fertilizer industry's agricultural communications program was

with good physical properties that contained up to 55% available P_2O_5

D. D. Bondarenko, weed control researcher, reported that of 76 million acres of corn in the U.S., 15 million acres are sprayed to control weeds. Still one of the most important chemicals tools is 2,4-D. A total of $21 million is spent annually for controlling weeds in corn alone, he said.

P. C. Pratt of the Leatherman Seed Co., Canton, Ohio, was elected president of the Ohio Pesticide Institute. Other 1958 officers are: J. J. Coyle Jr., Rohm and Haas Co., Cuyahoga Falls, first vice president; W. J. Majure, California Spray-Chemical Corp., Maumee, second vice president; J. D. Wilson, Ohio Agricultural Experiment Station plant pathologist, secretary; and V. H. Davis, Ohio Farm Bureau, Columbus, treasurer. H. E. Bennett, Shell Oil Co., was named business manager.★★

WASHINGTON REPORT

(*From Page 58*)

to detract from the strength of the proposal.

While the National Plant Food Institute was considered fully capable of carrying out the new program, undoubtedly its position of leadership is enhanced by the full cooperation of the nation's potash producers. Also, all parties involved are to be congratulated for their statesmanship in handling what appeared for quite a time to be a delicate and difficult problem.

* * * * *

Companies with an interest in certain programs of government agencies might well keep in close touch with Washington as closed-door sessions between government agencies and the Bureau of the Budget near the stage for presentation before subcommittees of the House Appropriations Committee. The drive is on to cut civilian expenditures. The charge is loosely made that industry always tells Washington to cut somebody else's expenses, but maintain the programs in which "we are interested." While this is true to an extent, there are many opportunities for industry to be of help to the government in budget proposals. Certainly the budget is for—we the people—and unless we make our views known, important programs could be lost in this year's appropriation scramble.

* * * * *

As a positive step to broaden the base in the field of agricultural communications, the U. S. Department of Agriculture is just releasing a film strip titled "A Job for You in Agricultural Journalism." The film is intended for use with high school and first year college students to encourage them to consider agricultural journalism as a career. It emphasizes that specialized college training in agricultural journalism can be put to use in radio, television, farm magazines, newspapers, and homemakers publications. Other fields are state extension work, government, advertising, industry, trade associations, public relations, and teaching.

This film strip has been encouraged, to a large extent, by the Agricultural Relations Council which is concerned about the maintenance of college enrollment in agriculture and related fields. The scarcity of qualified men in this field is illustrated by the fact that there were two jobs awaiting every graduate in agricultural journalism in 1957.

Individual prints of this film are available from Photo Lab Inc., 3825 Georgia Avenue, N.W., Washington 11, D.C., for $4.50.

Companies that are developing scholarship programs or maintaining active 4-H clubs, vocational agricultural, and related programs might want to review this film strip. Lyle Webster, Director of Information for the Department of Agriculture, is being congratulated for a job well done.

The fertilizer industry's agricultural communications program was much in evidence during the series of annual conventions in Chicago with the farm magazines, radio and television editors. Both *Farm Journal* and the *Georgia Farmer* were honored by the Institute for outstanding performance in the 5th Annual "Soil Builders Award for Editors Contest." Louis H. Wilson, Secretary and Director of Information of the Institute, made the presentation each year.

* * * * *

Washington editors and writers for many publications are indicating interest in the year-end story on agricultural chemicals, released by Don Miller of the National Agricultural Chemicals Association. This relatively new service reviews progress and general sales and market development of the industry for the year, and incorporates one or two page statements by members of the Association who accept the invitation to submit material to accompany this year end release.

Significance of this release is that it is an effective way of bringing to the attention of many editors and writers progress in the agricultural chemicals industry. It puts agricultural chemical information before many financial and editorial writers who ordinarily would not consider using material of this kind. By now you've probably seen echoes of this release in many business, financial, and trade papers, plus the financial columns of some of the nation's leading newspapers, as well as in commentary by radio and television newscasters.★★

GRANULATION

(*From page 29*)

varies substantially with temperature. The presence of calcium sulfate precipitate adds to the problem of satisfactory meter operation. The meter manufactured by the Foxboro Company which measures the flow magnetically is being installed in many plants for use with phosphoric acid. Reports on its performance appear to be very satisfactory. —*R. C. Smith.*

PHOSPHORIC ACID

(*From Page 51*)

mental work. It seems admirably adapted to the manufacture of high-analysis fertilizers, either solid or liquid. The authors of the paper referred to above, "Phosphoric Acid of High Concentration", offer the following suggestions on possible uses of the new raw material in fertilizer formulation.

"SINCE the acid can be diluted readily and hydrolyzed to obtain ordinary acid containing 75% H_3PO_4, it should serve the same purposes as such acid as well as offering a number of important advantages. The acid contains about 70% more P_2O_5 per unit of volume than ordinary acid, which should reduce the cost of handling and storage.

"Experimental work and tests in large-scale equipment have shown that the acid can be used to produce much more concentrated solid and liquid fertilizers. Phosphate rock was acidulated with the acid in a cone mixer to produce superphosphate with good physical properties that contained up to 55% available P_2O_5 as compared with 48% available P_2O_5 when regular acid was used. In the production of liquid fertilizer, use of the acid, which contains polyphosphoric acids, makes possible the production of solutions of higher concentration than can be made with ordinary phosphoric acid, which contains phosphate in the ortho form only. For instance, 11-33-0 and 11-36-0 liquid fertilizers were produced by ammoniation of the acid, whereas 8-24-0 is the most concentrated liquid produced from ordinary acid.

"Exploratory tests were made in which 8-24-0 liquid fertilizer was produced by the ammoniation of wet-process phosphoric acid to which superphosphoric acid was added to the extent of 10% of the total P_2O_5. Less of the impurities in the wet-process acid were precipitated as a result of the sequestering effect of the polyphosphates present. Superphosphoric acid might be used in conjunction with unconcentrated wet-process acid (32% P_2O_5) to produce liquid fertilizers.

The acid can be used to advan-

We have mentioned the phyto-

the phytotoxic tendencies of his con-

The acid can be used to advantage in the formulation of granular fertilizers. For example, use of the acid in the pilot-plant TVA continuous ammoniator to produce a 5-20-20 grade gave a higher temperature with the result that granulation occurred at a lower moisture content than when conventional acid or concentrated superphosphate was used. Consequently, the moisture content of the product was lower, and the product did not require drying.★★

AERIAL SPRAYING

(*From Page 44*)

receiving more attention over the past year or two. Here again lack of training and disregard of basic safety standards are the culprits, Mr. Hansen believes, rather than any insuperable danger inherent in the toxicant itself. Routine pilot testing, blood counts, plasma counts, cholinesterase activity testing can eliminate the major part of the danger and insure a pilot being taken off the job long before any acute hazard develops.

Finally, custom spraying could certainly be made much safer if there were not such strong emphasis on the cost factor. It is generally recognized that cost should not be the sole factor in allotting contracts. Cutting corners price wise leaves insufficient margin for adequate pilot training, safety equipment and the routine precautions of advance checking and preflying the job which can all contribute to a reduced accident rate.

The basic problem of custom spraying is to put the toxicant—in the correct concentration—just where it is supposed to be—on the pest-infected crop—and not on pastures, dwellings, water, other susceptible crops, etc. It takes plenty of pilot training to be able to guarantee this will be done efficiently and safely.★★

EMULSIFIABLE CONC.

(*From Page 49*)

chances of chemical burn. These ideas have to be considered from the standpoint of economics and field effectiveness.

We have mentioned the phytotoxic effect of solvents when present on plant tissues in appreciable quantities. This property is not peculiar to solvents. Toxicants and emulsifiers can also cause plant damage. If, by the time the spray droplet hits the plant, we can eliminate some or all of the concentrate ingredients, we should be able to reduce phytotoxic potentialities. Eliminating the toxicant is obviously pointless. The emulsifier is present in such small proportions that the elimination of any part of it would not be rewarding (assuming that it had fulfilled its function). The solvent, on the other hand, is present in amounts usually equal to or in excess of the toxicant. Its function of making the toxicant mobile was accomplished when the concentrate was prepared. The only function left to it is, perhaps, to help spread the toxicant particle on the leaf. Even then, the sooner it parts company with the toxicant, the better for the plant.

The solvents used in emulsifiable concentrates are volatile and, by selection on the basis of this property, the formulator can to some extent reduce the phytotoxic tendencies of his concentrate. A highly volatile solvent will evaporate faster from the sprayed emulsion, thereby reducing its contact time with the plant. The disadvantage which has to be balanced out is that the flash point and volatility of these solvents are inversely related and the formulator must select the solvent he believes is the best compromise between them.

The obstacles to formulating liquid emulsifiables which we have discussed are well-nigh insurmountable in present-day practice. In designing his concentrates, the formulator is constantly trying to meet opposing requirements. If he moves in the direction of stable emulsions, he is bound to conflict with minimum run-off. If he attempts too high a toxicant concentration, cold stability will be a worry. Fine particle size may bring foam troubles. The best concentrate a formulator can design today is one which gives the optimum control in the areas of his market at the price that his market and his plan can afford.★★

Weed Control Aids Florida Mosquito Program

THE city of St. Cloud, Fla., is now in its third year as a test area for the State Mosquito Control Board to develop effective and economical methods of ditch maintenance.

The city has about 43 miles of main ditches along streets running north and south through the town. These ditches drain surface water and rain water from streets and some swampy areas into East Tohopakeliga Lake, a 35-square-mile body of water north of town.

As the city's street-paving program continues, drainage is being provided by storm sewers and tile drains. Where drainage depends on ditches, however, there has been a continual problem of keeping vegetation from slowing the water flow and causing silt deposits and clogging. Hand-cleaning takes an almost prohibitive amount of labor and loosens up the soil surface.

In 1955 the city turned to a test program with chemical herbicides. The first test area was established on 600 lineal feet of ditch, five feet wide. Four pounds of Telvar DW weed killer were applied to this area in 100 gallons of water, and control was effective well into the 1956 season.

In 1956 the city set out to treat all drainage ditches and achieved a substantial saving in labor as well as a reduction of the mosquito population and thereby cut the need for insecticide dusting.

The ditch maintenance program now provides for a re-checking of all ditches every two years and re-spraying as needed. A two-man crew operates the sprayer from a pick-up truck during the six-week period that spraying is done.

The city experienced a one-third reduction in the annual mosquito control budget during the summer of 1957 when only six dustings of mosquito insecticides were required.

St. Cloud officials report no serious problems in the use of chemical weed killers. Special care is taken to avoid spraying on or near desirable

FOR YOUR LIBRARY

Name of Book and Author	No. Pps.	Price
Diseases of Field Crops J. G. Dickson	518	$ 8.50
Fundamentals of Fruit Production Gardner, Bradford, Hooker	740	9.00
Cotton Growing Problems Christidis, Harrison	633	9.75
Diseases of Fruit Crops Anderson	500	8.50
Insect Pests of Farm, Garden, & Orchard Peairs, Davidson	661	8.50
Spraying, Dusting & Fumigating of Plants Hough & Mason	726	6.95
DDT & Newer Persistent Insecticides West & Campbell	632	8.50
Auxins & Plant Growth Leopold	354	5.00
Diseases of Vegetable Crops Walker	528	7.50
Chemical Engineering Cost Estimation Aries & Newton	263	6.00
The New Revolution in the Cotton Economy J. H. Street	292	5.00
Soil Fertility & Fertilizers Tisdale, Nelson	430	7.75
Elements of Plant Protection L. L. Pyenson	536	4.96
Field Crops Rather, Harrison	417	5.50
Forest Fertilization White, Leaf	300	3.00
Soil-Plant Relationships C. A. Black	332	7.00
Grassland Seeds Wheeler & Hill	734	12.50
Chemistry of Plants E. V. Miller	174	4.75
A Guide to Some Pitfalls of Business I. I. Ackerman	107	3.00
Managing Southern Soils H. B. Vanderford	378	4.75
Advances in Pest Control Research Volume I R. L. Metcalf	514	11.00
Dangerous Properties of Industrial Materials N. I. Sax	1467	19.50

Send check with order to

AGRICULTURAL CHEMICALS

Caldwell, N. J.

CLASSIFIED ADVERTISING

Rates for classified advertisement are ten cents per word, $2.00 minimum, except those of individuals seeking employment, where the rate is five cents per word, $1.00 minimum. *Check must accompany all classified advertisements.* Address all replies to Classified Advertisements with Box Number care of AGRICULTURAL CHEMICALS, P. O. Box 31, Caldwell, N. J. Closing date: 10th of preceding month.

ENTOMOLOGIST: B.S. Age 33, married with family. Five years sales experience. Desires position in Texas, willing to re-locate. Address Box 189, c/o Agricultural Chemicals.

ENTOMOLOGIST: 35 years old, B.S. and M.S. in entomology, botany and chemistry minors. Experience: Research and development 5 years including formulation, testing and labeling of aerosols and small packages. Regulatory and survey work. Desires position in research or product development. Address Box 190, c/o Agricultural Chemicals.

CHEMICAL SALES: Wide experience with top national concern in marketing and sales of agricultural chemicals. B.S. in Horticulture. Age 35, married. Interested in sales management work. Address Box 191, c/o Agricultural Chemicals.

For Sale:

FOR SALE: Rotary dryers 7'x30', 6'x30', and 5'x30', Ribbon Mixers 40 & 90 & 225 cu. ft., 2—10,000 gal. aluminum storage tanks, Rotex & Tyler Screens, single and double deck, Micro Pulverizers, Raymond Mills, etc. Send us your inquiries. Brill Equipment Co., 2401 Third Avenue, N. Y. 51, N. Y.

FOR SALE: Good Rebuilt Equipment at Savings of HALF and MORE; Hersey Gas Fired Dryer 5' x 26' Sperry and Shriver Filters Presses upto 42" now in stock; Stainless Lancaster Rotary Reactor 50" x 17'4"; 5000 Gal. S/S mixing Tanks; 40 HP; Pebble Mills size upto 8' x 8'; NEW Falcon Ribbon Blenders all sizes; Hammer Mills upto 100 HP; Sifters by Rotex, Patterson, Robins; all sizes; Send for Bulletin "FIRST FACTS." FIRST MACHINERY CORP. 209-289 Tenth St. Bklyn. 15, N. Y.

FOR SALE: Beaird Dryer Model D-700, 4' x 30'; Steam Tube Dryers 4' x 30', 6' x 30', 6' x 45'. Dewatering Presses: Louisville 8-Roll 36"; Davenport #1A, #2A. Ribbon Mixers 336 cu. ft. Stainless Steel Tank 10,500 gal., Steel Tanks 4,300 gal. to 10,000 gal. Perry Equipment Corp., 1428 N. 6th St., Phila. 22, Pa.

trees or other plants or in locations where the chemical may be washed or moved into contact with their roots. To minimize movement of the chemical with water flowing in the ditch, the herbicide is fixed in the ditch soil by moisture.

The savings in total mosquito control expenses from the use of Telvar DW weed killer in the first year were enough to buy the chemical, pay for applying it, and still permit a one-third saving in the total budget. Telvar DW weed killer is a product of E. I. du Pont de Nemours & Co., Wilmington, Del.

Ditch on the left is shown one year after hand cleaning. A ditch on the opposite side of the road (right) is shown one year after chemical treatment.

Sohio Names Representative

The Sohio Chemical Co., Lima, Ohio, has named Sylvester Grant Jr. to the post of technical service representative, assisting H. H. Tucker director of agricultural technical services to the company.

Formerly, Mr. Grant performed customer services in Sohio's sales service and development laboratory. He came to Sohio in 1956 from the Vicksburg, Miss., works of Spencer Chemical Co. At Spencer his experience was in their research department and in product control as operating supervisor.

EDITORIAL

(*Continued from Page 27*)

dustry to explain the benefits of chemical insecticides to extension workers and the Department of Agriculture. The thinking of the industry and the department is very close on the subject of chemical insecticides. The same time and effort formerly spent in meetings of the industry and the Department of Agriculture will bring a lot more results if the public can be attracted to attend and thus be kept informed of new pest control developments.

In addition to exhibits, Pest-O-Rama will feature a full schedule of addresses by entomologists on the latest results of research and developments in controlling such pests as boll weevils, termites, imported fire ants, plant diseases, nematodes, weeds, and rodents. Sleeping space is being provided for some 600 4-H and F.F.A. boys and girls in the coliseum by the Pest-O-Rama committee which is doing much to give the presentation a state fair atmosphere.

Pest-O-Rama seems to us to be an excellent step in the direction of expanding sales by increasing the public's knowledge and confidence in chemical pesticides. Like organizations might well watch the results of Pest-O-Rama closely with the idea of duplicating the presentation in other sections of the country.

Northeastern Weed Council Executive Committee

The executive committee of the Northeastern Weed Control Council, which is meeting in New York, Jan. 8 to 10, are: back row (left to right) E. D. Whitman, Columbia-Southern Chemical Corp.; J. R. Havis, U. of Massachusetts; E. M. Rahn, U. of Delaware; D. A. Shallock, (Secretary-treasurer) Rutgers; and L. G. Utter, Diamond Alkali Co. Front row: S. N. Fertig (vice president), Cornell; C. L. Hovey (president), Eastern States Farmers' Exchange Inc.; and R. J. Aldrich, Michigan State University.

Aughtry Joins Grace

The Grace Chemical Co. Division of W. R. Grace & Co. has appointed Dr. J. D. Aughtry manager of agricultural services to its main offices in Memphis, Tenn.

A nitrogen fertilizer expert, Dr. Aughtry will assist the company sales force in technical problems concerning nitrogen applications and soil development. Before joining Grace, Dr. Aughtry specialized in nitrogen fertilizers application at the Dominican operations of the West Indies Sugar Corp.

•

Rassweiler Heads ACS

Dr. Clifford F. Rassweiler, vice president for research and development of the Johns-Manville Corp., New York, took office as the new president of the American Chemical Society this month.

Dr. Rassweiler succeeds Prof. Roger J. Williams of the University of Texas. Last year he won awards from the Industrial Research Institute and the Society of Chemical Industry.

•

Murphy Represents Du Pont

W. Delmer Murphy Jr. has been assigned as sales representative for Du Pont nitrogen products in Michigan, Wisconsin, and the Chicago area.

Mr. Murphy will handle sales of NuGreen fertilizer compound, Uramite fertilizer compound, Uramon ammonia liquors, and Two-Sixty-Two feed compound to the fertilizer and feed industries. He joined the Du Pont polychemicals department in 1956 as a market analyst.

•

Del-Mar-Va Elects Ford

James R. Ford was elected president of the Del-Mar-Va Peninsula Fertilizer Association at a meeting in Salisbury, Md., last month.

Mr. Ford is sales manager for the Warner W. Price Co., Smyrna, Del.

•

To Stress Fertilizer Use

"It's wise to fertilize" will be the theme of the 11th annual Utah tour by the Union Pacific Agricultural car, beginning at Tremonton, Utah, on Feb. 3.

More efficient farm production by application of fertilizer will be stressed during the three-week junket through the state.

Since the beginning of the tours in 1948 nearly 30,000 persons have climbed aboard the special car to view exhibits and listen to talks by Utah State University experts on various phases of agriculture.

Named AP&CC Vice President

Richard J. Hefler has been elected vice president, finance, of the American Potash & Chemical Corp., Los Angeles.

Mr. Hefler, who joined AP&CC in 1948, formerly was with the Hanover Bank in New York and E. I. du Pont de Nemours & Co., Wilmington, Del.

•

Cyanamid Division Manager

G. L. Berry has been appointed manager of manufacturing for the phosphates and nitrogen division of the American Cyanamid Co., New York.

Mr. Berry formerly was manager of the Welland, Ontario, plant of North American Cyanamid, Ltd.

•

Promoting Home Products

The Chemical Division of the Borden Co., New York, will open a year-long promotion campaign of "Borden's Products for the Home Handyman" on the West Coast early next month.

Displays featuring Borden's full line of vinyl garden hoses and sprinklers and Borden's 38, a high-nitrogen ureaform fertilizer, will be featured at a series of conventions and exhibits throughout the year.

Highlight of the campaign will be a Borden's Garden Festival from May 24 to June 21.

•

Names Five Representatives

The Retzloff Chemical Co., Alameda, Texas, has announced the assignments of five sales representatives for its Agrichemical Emulsifiers.

The Industrial Chemical Co., Issaquah, Wash., will serve Washington, Oregon, and Western Idaho. The F. M. Speekman Co., San Francisco, will serve northern California; and W. G. Wunderly, Pasadena, will serve southern California.

Vulcan Sales Co., Mission, Kans., will serve Iowa, Kansas, Missouri, Nebraska, and Oklahoma; and the Hukill Chemical Co., Cleveland, will serve Ohio, southern Michigan, and western Pennsylvania.

The company's present marketing area is in Texas and the Delta States.

INDEX to ADVERTISERS

TALE ENDS

THE following bit, purporting to describe a newly developed insecticide has come to us from a long-time reader of *Ag Chemicals*. The new product, 2,3 Biethanol-4,5 Reaminenol-2 1-5, Willkillyouall, he reports, is being sold by local dealers under the simplified trade name of 2,3-4,5-2-5 BREW.

"BREW has a toxicity to mamallia comparable to that of 494 grams of Sodium Cyanide administered intravenously. Mode of action of the insecticide is apparently quite similar to that of the Cyanide — cell nuclei are immediately stimulated and ejected from the cell with a propulsive force which literally leaves the test animal as but a shell of its former self.

"Unfortunately, members of the order Insecta are unaffected by the primary action of BREW—but reaction to secondary forces apparently stimulates fantastic growth. Recently, Dr. Goethe of our research staff was trampled by one of our test ants, and had to be counted a total loss.

"Because of unfavorable public reaction, our company has decided to change the name of BREW to WERB and sell it to insects as a mammalicide aimed at eliminating human pests."

AC

Something novel in the way of a Christmas gift for the entomologist is a pair of "Lucky Bugs" cufflinks. Bugettes of Hollywood, 2014 Laurel Canyon Blvd., Hollywood 46, Calif., offer these novelty links at $10 a pair. Actual beetles are hand-set in clear lucite and mounted in 14-K gold plate. Just the item for your favorite entomologist.

AC

Residents of Little Rock and Memphis may think twice before they schedule future meetings with so predominantly a northern registration list. These Damyankees bring their weather with them. At the session of the Agricultural Ammonia Institute in Governor Faubus' home town last month it was a cool 14°, while at the cotton meeting in Memphis the record was just about as bad —18°. An unlikely climate in which to work up a sun tan.

AC

Florida was down in the freezing brackets, too, as the CSMA met in Hollywood. With half the Florida citrus and vegetable crop frozen out, it is a certainty that every agricultural chemical aid available will be employed the balance of the winter growing season in an effort to harvest the maximum possible crop from areas that were not frost damaged.

AC

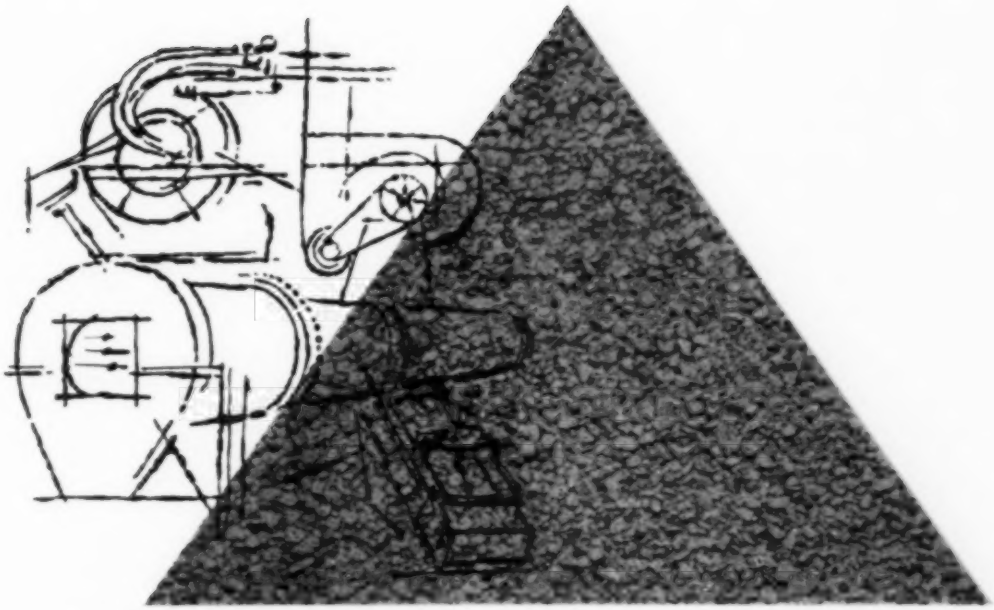
If it isn't frost or hail, it can always be drought or, conversely, too much rain. And it was too much rain this year in much of the cotton South. Many cotton farmers lost their crops, and it does not take a clairvoyant to predict that there will be collection problems on fertilizer and insecticide sold for '57 application in the cotton belt.

AC

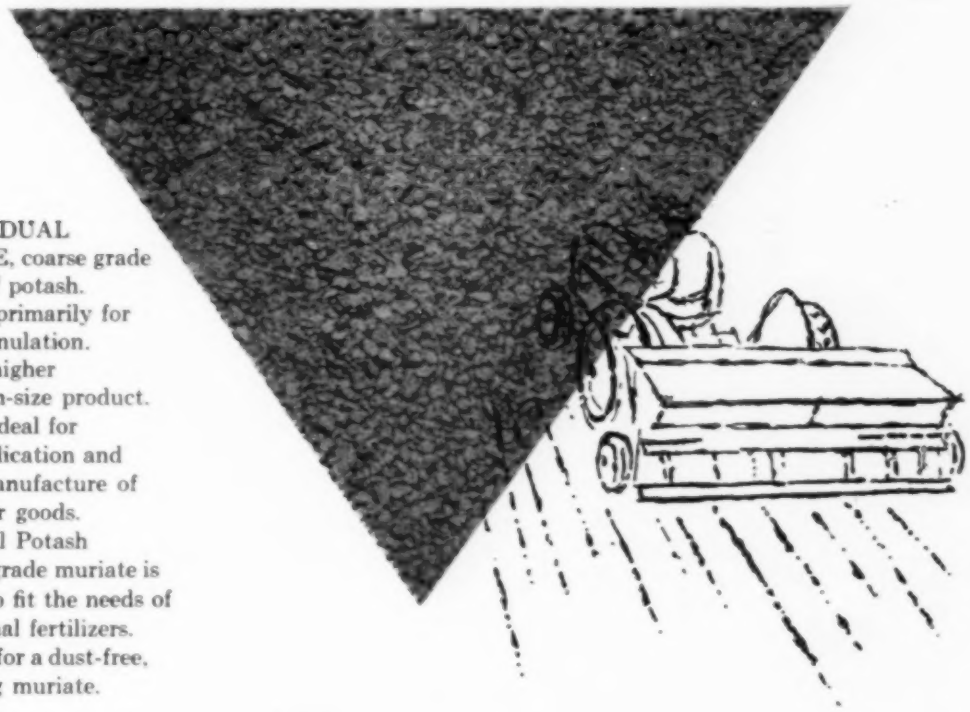
A patent, issued in 1955, was ruled invalid last month by a U. S. District Court. The patent had been protested by 28 firms from 15 states, all of whom claimed that the process of putting feathers in a pressure cooker and coming up with either fertilizer or a high-protein animal food had been used for years. It was brought out in the trial that a British patent had been issued on an 1874 process that could also come up with a third product—glue.

AC

The Atomic Energy Commission is studying the possible use of special fertilizers to neutralize radio-active debris from atomic reactor explosions, or possibly even from atomic attacks. By neutralizing strontium-90 in contaminated soil, the fertilizer could prevent its being absorbed by plants and thus moving up the food chain to man.



LET NATIONAL POTASH SERVE YOU



Here is a DUAL PURPOSE, coarse grade muriate of potash. Designed primarily for use in granulation. It gives a higher yield of on-size product. It is also ideal for direct application and for the manufacture of top dresser goods.

National Potash standard grade muriate is designed to fit the needs of conventional fertilizers. Processed for a dust-free, non-caking muriate.

NATIONAL POTASH COMPANY

205 EAST 42nd ST. • NEW YORK 17, N. Y. • ORegon 9-4950
212 Bell Building • MONTGOMERY, ALA. • AMherst 5-8234

LIVESTOCK PARASITES

IT'S during the winter months that biting and blood-drinking lice torture dairy herds and beef cattle.

Easiest, quickest way to control these annoying pests is to treat livestock with Pyrenone* fly spray, either oil-based or emulsion type. It not only rids the animals of flies and lice, but Pyrenone won't show up in milk and meat — even after repeated applications.

For *dry* control of lice, during cold weather, many dairymen prefer to use Pyrenone parasite powders. A decided advantage is the fact that the powders are equally effective against *resistant* rat fleas and roaches in food rooms.

Of course, the best recommendation for cattle grubs is an application of always-dependable rotenone — either as a dust or as a suspension for use in power sprayers. Rotenone also kills irritating lice and ticks.

For complete information on special products — such as, rotenone-*butoxide* emulsions, general purpose parasite powders and Pyrenone liquid dressing for show animals — write the nearest office of Fairfield Chemical Division, Food Machinery and Chemical Corporation. Branches in Principal Cities. In Canada: Natural Products Corporation, Toronto and Montreal.

*REG. U.S. PAT. OFF. F.M.C.

Pyrenone

Putting Ideas to Work

fmc
FOOD MACHINERY AND CHEMICAL CORPORATION

FOOD MACHINERY AND CHEMICAL CORPORATION
Fairfield Chemical Division
Sales Headquarters
441 LEXINGTON AVENUE, NEW YORK 17, N. Y.